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USSR Report

CHEMISTRY

No. 91



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ADSORPTION

UDC 541.183.3

KINETICS OF FORMATION OF ADSORPTION LAYERS OF LONG-CHAIN SURFACE-ACTIVE IONS ON EASILY MOBILE PHASE DIVISION BOUNDARIES: ADSORPTION OF CETYLTRIMETHYLAMMONIUM FROM AQUEOUS SOLUTIONS AT BOUNDARY WITH AIR AND WITH OCTANE

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA, SERIYA 2: KHIMIYA in Russian Vol 23, No 3, May-Jun 82 (manuscript received 25 Aug 81) pp 243-249

ZADYMOVA, N. M., TSIKURINA, N. N. and MARKINA, Z. N., Department of Colloid Chemistry

[Abstract] The study of the kinetics of formation of ionized adsorption layers of surfactants generates information on their structure, which is little studied due to the lack of direct methods of investigation. The studies indicated that the activation energy of adsorption was virtually 0. The ion desorption rate coefficients increase slightly with temperature. The standard thermodynamic functions of adsorption and desorption of CTA ions to and from monolayers at the division boundaries were calculated. Analysis of the kinetic data produced indicates that adsorption layers of CTAB (bromide) include areas with varying degrees of interaction among the long-chain ions. The loss of entropy in the process of activation of adsorption of CTA ions is practically identical for low and moderate degrees of water-air division boundary surface filling. The kinetic model of adsorption of long-chain ions is used to analyze the mechanism of introduction of ions of a typical cation-active stabilizer (CTAB) into the adsorption layer and the departure of them from it into the aqueous phase, as well as certain specifics of the structure of ionized adsorption layers of this surfactant. There is found to be a significant entropy activation barrier in the adsorption of long-chain diphilic ions from aqueous solutions; this barrier is related to the need to orient them, there is, also, an activation barrier, entropic in character, for desorption, due to loss of conformation entropy of the hydrocarbon radicals desorbing the surfactant ions and due to the specific structure of the solvent. Figures 3; references 8: 6 Russian, 2 Western. [281-6508]

ALKALOIDS

UDC 547.944/945

STRUCTURE OF SIBIRIN

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 2, Mar-Apr 82
(manuscript received 28 May 81) pp 225-227

OSMANOV, Z., IBRAGIMOV, A. A. and YUNUSOV, S. Yu., Order of the Red Banner of Labor Institute of Plant Substance Chemistry, UzSSR Academy of Sciences, Tashkent

[Abstract] Continuing their study of the surface parts of *Nitraria sibirica* Pall gathered near the settlement Rybach'ye in Kirghizia in May, 1976, the authors isolated a new optically-active liquid base $C_{11}H_{21}NO$, which they named sibirin, and a number of derivatives. Features of infrared spectra are discussed. Since the PMR spectrum contained N-methyl proton signals, the authors suggest that sibirin is an N-methyl derivative of nitramine or isonitramine. Further examinations and comparisons indicated that it is an antipode of N-methylisonitramine with the structure 2-methyl-2-azaspido[5,5]undecane-7-91. Chemical procedures are given in the experimental section.
References 2 (Russian).
[271-12131]

UDC 546.944/945

BAYKALIN, A NEW APORPHINE ALKALOID FROM THALICTRUM BAICALENSE

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 2, Mar-Apr 82
(manuscript received 26 Jun 81) pp 227-230

MAYEKH, S. Kh., YUNUSOV, S. Yu., BORKO, E. V. and STARCHENKO, V. M., Order of the Red Banner of Labor Institute of Plant Substance Chemistry, UzSSR Academy of Sciences, Tashkent; and Pacific Ocean Institute of Bioorganic Chemistry, Far Eastern Scientific Center, USSR Academy of Sciences, Vladivostok

[Abstract] Continuing their study of Far Eastern Thalictrum, the authors examined the peculiar East Asian *Th. baicalense* Turcz, included among *Physocarpum* DC. in the publication FLORA USSR but distinguished from other

meadow rues by its swollen egg-shaped or round woody fruits. It is found in southeastern Siberia, the Amur river basin and Korea; the specimens examined came from the Khabarovsk region. Infrared, mass and NMR spectra showed that the crystalline, optically-active base here named baykalin is a new, penta-substituted noraporphine base from which N-methyl- and N-acetyl baykalin were derived. Its structure is 2,3-methylenedioxy-1,9,10-trimethoxynoraporphine. Chemical procedures are given in the experimental section. References 7: 2 Russian, 5 Western.
[271-12131]

UDC 615.322:547.92 (Crinum)

ALKALOID COMPOSITION OF CRINUM AMABILE BULBS

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 2, Mar-Apr 82
(manuscript received 15 Sep 81) pp 263-264

MURAV'YEVA, D. A. and POPOVA, O. I., Pyatigorsk Pharmaceutical Institute

[Abstract] Of more than 130 alkaloids in plants of the family Amaryllidaceae, the most valuable pharmacological forms are lycorine and galantamine. The authors studied surface and underground parts of Crinum amabile Donn. to determine alkaloid content. They found 0.78 and 0.74% total alkaloids in the leaves and roots, respectively, and 1.56% in the bulbs after first frost. These were lycorine, hippeastrine, crynidine, galantine, galamantine, narvedine and tazettine. References 5: 3 Russian, 2 Western.
[271-12131]

UDC 547.944/945

HYMENOCALLIS LITTORALIS ALKALOIDS

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 2, Mar-Apr 82
(manuscript received 16 Oct 81) pp 264-265

DABIRE, FREDERICK MUNVIME, and MURAV'YEVA, D. A., Pyatigorsk Pharmaceutical Institute

[Abstract] The perennial Hymenocallis littoralis Salisb. was studied from specimens gathered in Upper Volta and the Ivory Coast. All parts were examined by thin layer chromatography on KSK silica gel. The authors identified lycorine, tazettine and previously unidentified substances named trisferidine, hippeastrin (trisferine), pancratine (hemanthidine) and galantamine. References 9: 2 Russian, 7 Western.
[271-12131]

UDC 547.944/94

ALKALOIDS OF ACONITUM SAPOSHNIKOVII AND A. KARACOLICUM

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 2, Mar-Apr 82
(manuscript received 27 Nov 81) pp 265-266

SULTANKHODZHAYEV, M. N., YUNUSOV, M. S. and YUNUSOV, S. Yu., Order of the Red Banner of Labor Institute of Plant Substance Chemistry, UzSSR Academy of Sciences, Tashkent

[Abstract] The authors studied shoots of *aconitum saponnikovii* B. Fedtsch collected in the Dolon pass of Kirghizia. Chloroform extraction yielded 0.54% total alkaloids, from which talatisamine, isoboldine, 14-acetyltaletisamine and a base $C_{24}H_{37}NO_5$ were isolated. From surface parts of *Aconitum karacolicum* Rapaics gathered in the upper Tyup river basin, they identified aconitine, zongorine, isoboldine and napelline N-oxides, along with a new base $C_{24}H_{35}NO_5$. NMR and infrared spectra indicate the latter to be an N-oxide of 12-acetyl-napelline. References 9: 7 Russian, 2 Western.

[271-12131]

UDC 615.277.3:547.94:582.937].074

METHOD FOR DETERMINING VINBLASTIN AND LEUROSIN IN SURFACE PARTS OF CATHARANTHUS ROSEUS

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 6, Jun 82
(manuscript received 14 Apr 81) pp 708-715

SAPUNOVA, L. A., GAYEVSKIY, A. V., MASLOVA, G. A. and GRODNITSKAYA, Ye. I., All-Union Scientific Research Institute of Medicinal Plants, Moscow Oblast

[Abstract] Vinblastin and leurosin from *Catharanthus roseus* (L.) G. Donn, with antineoplastic and antileukotic effects, are being studied in many countries, but little has been written on determining their presence in the raw plant. The authors propose a method for simultaneous measurement of both substances using sephadex and unidirectional thin layer chromatography. The procedures include extraction and purification of total alkaloid content using benzene and/or toluene, separating the alkaloid mixture using a silica gel (from the West German Merck firm) and extraction-photometric determination of the alkaloids after chromatography. After grinding the analytical sample, one of two methods is used for extracting and purifying the target alkaloids, depending on the quality of the raw material. Other steps include preparing the calibration graph and sorbents, readying the column with sephadex and calibrating the column. References 8: 2 Russian.

[269-12131]

ANALYTICAL CHEMISTRY

UDC 542.61

EFFECT OF INTRODUCING SULFUR INTO MOLECULES OF NEUTRAL ORGANIC PHOSPHORUS
EXTRACTANTS ON THEIR EXTRACTION CAPABILITY FOR URANIUM(VI) AND CERIUM(III)

Leningrad ZHURNAL OBSHCHEY KHMII in Russian Vol 52, No 6, Jun 82
(manuscript received 9 Nov 81) pp 1232-1235

ROZEN, A. M. and YURKIN, V. G.

[Abstract] Like oxygen, sulfur is an electron donor, although of weaker strength. The authors studied the prospects of using sulfur-containing extractants to obtain actinoid and rare earth elements, with a series of bifunctional compounds containing PO and SO groups. Results indicated that replacing one ester atom of oxygen with sulfur brought no noticeable change in the reaction capability of phosphates with $(C_4H_9O)_2POSC_4H_9$ as extractant. If sulfur was separated from phosphoryl groups by CH_2 groups, the negative induction effect weakened in direct correlation to the distance of the sulfur from the PO group; the extraction constant increased and extraction capability approached that of phosphonates. In thioester compounds, sulfur was a weak extraction center. Disulfoxides retained the properties known for diphosphine dioxides, but the transition to the former brought reduced extraction, in a manner analogous to that reduction in the transition from monodentate extractants containing phosphorus to monodentate sulfoxides. Replacing the PO group with SO groups in diphosphine dioxides sharply reduced extraction capability for nitric acid, uranium and cerium. Figures 2; references 4 (Russian).
[283-12131]

EFFECTS OF INTRODUCING SULFUR IN MOLECULES OF ACID ORGANOPHOSPHORUS EXTRACTANTS
ON THEIR EXTRACTION CAPABILITY FOR URANIUM (VI) AND CERIUM (III)

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 52, No 6, Jun 82
(manuscript received 29 Dec 81) pp 1235-1237

ROZEN, A. M. and YURKIN, V. G.

[Abstract] The title substitution was studied using di-2-ethylhexyl phosphoric acid. Oxygen was replaced by sulfur in both PO and OH groups using di-2-ethylhexyldithiophosphoric acid and its analog diphenyldithiophosphoric acid. The di-2-ethylhexyl- variant extracted nitric acid more weakly by an order of one than did the initial acid. There was a sharp decrease in reaction capability for uranium (VI) and cerium (III), although the cation exchange in the weak acid zone and solvate exchange in higher acidity continued. Gradual oxidation of di-2-ethylhexyldithiophosphoric acid took place even at low concentrations of nitric acid, and became faster as those concentrations grew, forming a product that had greater reaction capability for uranium (VI). Introducing highly electronegative substituents did not change effectiveness for cerium (III), but significantly reduced it for uranium (VI). Figures 1; references 4 (Russian). [283-12131]

BIOCHEMISTRY

UDC 547.752

QUATERNARY PYRIDINIUM SALTS OF INDOL DERIVATIVES

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 35, No 5, May 82
(manuscript received 26 Jan 81) pp 341-343

YESAYAN, Z. V., CHACHOYAN, A. A. and PAPAYAN, G. L., Institute of Precision Organic Chemistry imeni A. L. Mndzhoyan, Armenian Academy of Sciences, Yerevan

[Abstract] The oxoindolyl-3-acetic acid required for the synthesis of aminoethyl derivatives of triptamine with the oxoindol ring was obtained from indolyl-3-acetic acid by treating an ester of this acid with bromosuccinimide in the presence of pyridine, resulting in the formation of salts of pyridine in the second position of the indol ring. References 2: 1 Russian, 1 Western. [280-6508]

UDC 621.039.85:547.514.483

LABELED PROSTAGLANDINS (REVIEW)

Minsk VESTSI AKADEMII NAVUK BSSR: SERYYA KHIMICHNYKH NAVUK in Russian No 3, May-Jun 82 (manuscript received 26 Mar 81) pp 73-89

STRIZHAKOV, O. D., Institute of Bioorganic Chemistry, Belorussian Academy of Sciences

[Abstract] Studies of the synthesis and practical utilization of prostaglandins and their analogs have developed rapidly in recent years. This review discusses extensive studies on the mechanism of action of prostaglandins and their genetic relationship with other bioregulators. Chemical methods of production of labeled prostaglandins are briefly discussed and a table of labeled prostaglandins, their derivatives and their metabolites is presented. Methods include introduction of labels to natural prostaglandins, synthesis of prostaglandins from labeled precursors and by chemical modification of prostaglandins. Biochemical methods of production of labeled prostaglandins from labeled precursors are widely used. Labeled prostaglandins are used to study the biological activity of the substances to determine their mechanism of action.

The method of labeled prostaglandins has been found quite useful in medical practice, involving determination of prostaglandins in pathological changes and for diagnostic purposes. References 126: 12 Russian, 114 Western. [282-6508]

UDC 54.866+660

PROSPECTS FOR USING BIOCATALYSIS IN CHEMICAL TECHNOLOGY

Moscow ZHURNAL VSESOYUZNOGO KHMICHESKOGO OBSHCHESTVA IM. D. I. MENDELEYEVA
in Russian Vol 27, No 3, May-Jun 82 pp 302-308

BEREZIN, I. V., corresponding member, USSR Academy of Sciences; director, Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences; chief, Department of Chemical Enzymology, Moscow State University imeni M. V. Lomonosov

[Abstract] Enzymes have long been of theoretical interest for their high degree of specificity and high catalytic activity. Practical uses, however, have been limited due to high costs, homogeneity as catalysts, and their stability as technical enzymes. The author reviews enzyme synthesis of complex organic substances from simple compounds, yielding such products as 3,4-diohydroxyphenylalanine for treating Parkinson's disease, and synthesis of L-amino acids using amidase and racemase. Antibiotic production also utilizes various enzymes to obtain, for example, 6-aminopenicillanic acid. Enzymatic and microbiological treatment of biopolymers has led to production of edible sugars, such as glucose-fructose syrup, from waste products of the paper, lumber and food-producing industries. Enzymes are also being used as detectors, as the biochemical heat element in bioelectrocatalysis, and in energy conversion and assimilation for purifying waste and regeneration. References 51: 28 Russian, 23 Western.

[279-12131]

CATALYSIS

UDC 541.124/128.3+542.942.2+547.534+546.47:549.67

INFLUENCE OF COMPACTION PRODUCTS OF VARIOUS TYPES ON DEVELOPMENT OF ZINC-ZEOLITE CATALYST FOR PROCESS OF POLYMOLECULAR DEHYDROGENATION OF ETHYLBENZENE

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA, SERIYA 2: KHIMIYA in Russian
Vol 23, No 3, May-Jun 82 (manuscript received 6 Jul 81) pp 272-277

NGO TKHI TKHUAN, RUDENKO, A. P. and TOPCHIYEVA, K. V., Departments of Petrochemistry and Organic Catalysis and of Physical Chemistry

[Abstract] Experiments were performed with ethylbenzene on a 0.75 ZnY catalyst preliminarily treated with various quantities of styrene, cyclohexene, toluene, benzene, 1-hexene and pyridine to determine the role of compaction products produced from ethylbenzene and the influence of foreign compaction products on the process of development of zinc-zeolite catalysts. Deposition of compaction products from other substances onto the surface of the catalyst was found to facilitate development, with styrene having the greatest accelerating effect. Benzene, which produces little or no compaction products under the experimental conditions, had no effect. The studies of transformation of styrene under these conditions confirmed that it acts as an intermediate monomer in the polycondensation of ethylbenzene to compaction products.

Figures 4; references 5: 5 Russian, 1 Western.

[281-6508]

UDC 541.128

PROMOTION OF NICKEL-COPPER PHOSPHIDE CATALYSTS

Minsk VESTSI AKADEMII NAVUK BSSR: SERYYA KHIMICHNYKH NAVUK in Russian
No 3, May-Jun 82 (manuscript received 29 Dec 81) pp 27-30

YERMOLENKO, Ye. N., SIDEL'TSEVA, M. A., YEROFEYEV, B. V. and GERASIMOVA, L. V., Institute of Physical and Organic Chemistry, Belorussian Academy of Sciences

[Abstract] A study is made of the possibility of increasing the activity and selectivity of nickel-copper phosphide catalysts by promoting them with sodium hydroxide. Analysis of X-ray diagrams of the initial specimens showed that

before heating they were radiologically amorphous. After heating in an atmosphere of nitrogen at 260°C, in addition to the well expressed copper reflexes, the diffraction diagrams also show peaks corresponding to nickel phosphides. Therefore both nickel phosphides with an overall formula of Ni_{12}P_5 and a solid solution of phosphorus and copper in nickel are present after heating in nitrogen. Studies of catalytic activity show that the conversion of cyclohexanol can reach 99.0% in the presence of the Ni-Cu-P catalyst. However, in unpromoted catalyst the dehydrogenation is accompanied by formation of significant quantities of benzene and products of its hydrogenation. Promotion with sodium hydroxide significantly increases the selectivity for cyclohexanone. Figure 1; references 7 (Russian).
[282-6508]

UDC 541.127+547.313.3

PROPYLENE POLYMERIZATION ON COMPLEX CATALYST CONTAINING $\delta\text{-TiCl}_3 \cdot 0,3\text{AlCl}_3$ AND VARIOUS ALUMINUM ALKYLS

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMICHESKAYA
in Russian No 3, May-June 82 (manuscript received 11 Apr 80) pp 38-44

ZAVOROKHIN, N. D., FAVORSKAYA, M. V. and ZHUBANOV, B. A., Institute of Chemical Sciences, KaSSR Academy of Sciences, Alma-Ata

[Abstract] Propylene polymerization is characterized by sudden increases in rate followed by slowing when heterogeneous catalysts are used. The authors tested AlEt_2Cl , AlEt_3 , $\text{Al}_i\text{-Bu}_2\text{Cl}$, $\text{Al}_i\text{-Bu}_3$ and $\text{Al}_i\text{-Bu}_2\text{H}$ to determine their effects on activity and stereoregularity of the title catalyst. Results showed that the nature of the aluminum alkyl had a significant impact on the rate and nature of polymerization. AlEt_2Cl and $\text{Al}_i\text{-Bu}_2\text{Cl}$ slowly formed active centers and "levelled" the rate of polymerization, while AlEt_2 or $\text{Al}(i\text{-Bu})_2\text{H}$ caused quicker activity. Not only the rate of polymerization but, also, the nature of its kinetic dependence and the stereoregulatory ability of the active centers was tied to the precise aluminum alkyl used. The active centers were identified to be bimetallic complexes containing both titanium and aluminum. In the formation of the catalyst $\delta\text{-TiCl}_3 \cdot 0,3\text{AlCl}_3\text{-AlR}_3$ (AlR_2H), two unstable types of active centers are formed that then are destroyed in accordance with monomolecular principles. Figures 3; references 20: 6 Russian, 14 Western.
[2'0-12131]

UDC 547.533+542.943+542.958

OXIDIZING AMMONOLYSIS OF p-TERT-BUTYL TOLUENE ON VANADIUM-TITANIUM CATALYST

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSSKOGO SSR: SERIYA KHIMICHESKAYA in Russian No 3, May-Jun 82 (manuscript received 8 Oct 79) pp 61-64

CHMYR', I. M., BUKEYKHANOV, N. R. and SUVOROV, B. V., Institute of Chemical Sciences, KaSSR Academy of Sciences, Alma-Ata

[Abstract] The p-Tert-butylbenzonitrile (TBBN) is used to prepare benzoguanine resins; it is also used in preparation of p-tert-butyl benzoic acid which can modify and stabilize polymers. Synthesis of TBBN by oxidative ammonolysis of p-tert-butyltoluene produces a yield of slightly more than 50%. When this synthesis is catalyzed with $V_2O_5:TiO_2$ in a ratio of 1:0.5, a yield of 83-87% TBBN is obtained. TBBN is converted to terephthalonitrile under harsher experimental conditions. Oxidizing ammonolysis of tert-butylbenzene and TBBN involves oxidizing dealkylation of the tert-butyl substituent and deep oxidation of resulting phenyl radicals. Chemical procedures are given in the experimental section. Figures 3; references 9: 6 Russian, 3 Western. [270-12131]

UDC 547.233.1.2

ADVANCES IN SYNTHESIS OF AMINO DERIVATIVES OF TERPENOIDS

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 2, Mar-Apr 82 (manuscript received 2 Sep 81) pp 145-159

KOZLOV, N. G., Institute of Physico-Organic Chemistry, BSSR Academy of Sciences, Minsk

[Abstract] Although little studied, terpene derivative amines are employed as fuel antioxidants and in the production of medications and pesticides. The author reviews their discovery since first found by Leuckart in 1887 until the present. Leuckart's reaction of camphor with formamide has remained a standard process, with synthesis of amines by oxime reduction being of interest for studying the stereochemistry of endo- and exomorphic forms. Ketone oximes are reduced to form various caranes and pipanes. While primary amines are obtained in such reactions, there are no descriptions of secondary amines being so obtained. The Leuckart reaction is used to reduce aldehydes and etones with formamide and formic acid; a mixture of formamide with ammonium formate or ammonium carbonate and 85-90% formic acid can be used to produce amines. Although it is the basic method, it has such limitations as the need for two stages and for long heating of the reacting mixture. Also, unsaturated aldehydes and ketones of terpenes form isomers and tar. In reduction amination of terpene ketones, the most effective catalyst, by yield and selectivity, is platinum, followed by palladium and Raney nickel. A common method here is

a two-stage synthesis of N-substituted terpene amines, used to produce bornylamines from camphor and aliphatic or aromatic nitriles. A recent process for reduction amination of camphor by formamide in a hydrogen stream in the presence of a copper-aluminum catalyst produced N-methyl-substituted amines in a single stage for the first time. References 98: 23 Russian, 75 Western. [271-12131]

UDC 541.128

CATALYSIS, AN IMPORTANT MEANS FOR CONSERVING RAW MATERIALS AND ENERGY AND IMPROVING PRODUCT QUALITY

Moscow ZHURNAL VSESOYUZNOGO KHMICHESKOGO OБSHCHESTVA IM. D. I. MENDELEYEVA
in Russian Vol 27, No 3, May-Jun 82 pp 267-274

BORESKOV, G. K., director, Institute of Catalysis, Siberian Branch, USSR Academy of Sciences; Chairman of the Scientific Council for Catalysis, Siberian Branch, USSR Academy of Sciences, and of the Scientific Council for Problems of Catalysis and Its Industrial Uses, USSR State Committee for Science and Technology; chief, Department of Catalysis and Adsorption, Chemistry Faculty, Novosibirsk State University

[Abstract] The author reviews applications of catalysts in chemistry, petroleum refining and petrochemical production, showing the savings realized in resources and manpower and stressing the need for further advances. His report is divided into sections on new research methods such as Auger-, X-ray- and photoelectron spectr copy for precise determination of electron bond energy, transitional catalysis related to side reactions, using the examples of oxidation of sulfur dioxide in mass production of sulfuric acid and air pollution control, and catalysis by fixed complexes, which involve catalysts that are attached to solid carriers, thus avoiding the problem of separating catalysts from final products of reaction. Varying the composition of fixed catalysts permits high activity and selectivity. Other topics in the author's survey are permeable crystalline catalysts, such as synthetic zeolites, which have large enough dimensions for reacting substances to penetrate, and photocatalytic methods for converting the sun's energy into chemical energy. Among zeolites, Soc ny-Mobil's ZSM is discussed as an example of a super-silica component of stable catalysts. Such active, stable catalysts are being used to produce liquid hydrocarbon fuels from methanol and natural gas. Figures 15; references 27: 17 Russian, 10 Western.

[279-12131]

CHEMICAL INDUSTRY

NEW TECHNOLOGIES FOR CHEMICAL PRODUCTION

Moscow IZVESTIYA in Russian 9 Jun 82 p 2

[Article by Academician G. Boreskov, director of the Institute of Catalysis, Siberian Department, USSR Academy of Sciences, and Yu. Matros, laboratory chief and doctor of technical sciences, Novosibirsk, in the column "Science for Production": "Taming the 'Thermal Wave'--Energy-Saving Technologies Developed for Chemistry"]

[Text] A modern industrial apparatus for a daily production of 1000 tons of sulfuric acid, an important component of fertilizers, can reach a height of 40 meters. On the exterior of the apparatus there are expensive steel heat converters with a working surface area of tens of thousands of square meters. The total weight of the metal used in construction can reach 1500 tons.

An apparatus of the same capacity, planned for use in a new, so-called nonstationary production system, weighs approximately one-tenth that. No less important is the advantage that it can process and preserve gases resulting from nonferrous and ferrous metallurgy that cannot be used immediately. Processing of these gases allows recovery of several million tons of sulfuric acid and pyrite, which represents a huge saving of energy.

This is one of the results of new developments at the Institute of Catalysis of the Siberian Department, USSR Academy of Sciences, obtained on the basis of fundamental research on nonstationary process in catalytic systems.

Increased efficiency, reduced energy consumption per unit of production, and decreased cost prices are all demands of our time. The importance of solving these problems was emphasized by comrade L. I. Brezhnev in his appearance before the November (1981) Plenum of the CPSU Central Committee. Staff personnel at the Institute of Catalysis of the Siberian Department, USSR Academy of Sciences are working on solutions in the field of chemical manufacturing. The so-called "nonstationary" technologies that are being developed permit considerable reductions in capital expenditures, increased output of useful chemical products, and elimination, or significant reduction, of fuel consumption. They also open up the possibility of creating inexpensive means of cleaning up industrial wastes that are sent into the atmosphere.

Today, chemists, in cooperation with technologists and mathematicians, can determine the optimal conditions for carrying out a technological process. If all processes involved in the chemical industry could be carried out under optimal conditions, the total economic effect would constitute billions of rubles a year. Why is it then that in practice, in the majority of cases, chemical equipment operates at a level far from optimal?

The efficiency of a catalyst is determined by the composition and temperature of the mixture in the reactor. For example, if a reaction results in the production of heat, then the temperature will rise in proportion to the quantity of raw material being processed. An optimal system often requires just the opposite: a lowering of the temperature. It is impossible to achieve the most advantageous conditions for the chemical processes using the traditional stationary technological methods. Their inadequacy can be only partially compensated for by erecting a costly apparatus with complicated attachments for removal and delivery of heat and materials.

The problem, as we see it, is complex. Even so, a practical solution has been found, thanks to the research done at the Catalysis Institute on catalytic processes in nonstationary conditions. What then is the key to the solution?

To put it very simply, a chemical reactor can be visualized as a cylinder full of small granules of the catalyst. A mixture of substances enters through one end of the cylinder. With the help of the catalyst, this mixture will become the final product. We managed to create conditions in which a thermal wave, having a particular temperature profile within a layer of the catalyst, could provide maximum speed in the formation of the desired product. The catalyst granules will heat up and cool off repeatedly. Switching the direction of entry of the reaction mixture will force the thermal wave to move alternately from one end of the reactor to the other, without leaving the space in which the reaction is taking place.

Practical application of this method in the chemical industry eliminates construction of complicated and expensive heat converters; it eliminates the significant energy consumption involved in the preparatory heating of the mixtures, and it permits the creation of temperature fields and working mixture concentrations that are close to optimal. The main reserves for increasing efficiency of catalytic processes are hidden in a more complete exploitation of the possibilities of the catalyst itself.

At the Institute of Catalysis mentioned above, experimental work is being done on different methods of creating nonstationary conditions for catalysts and reactors. Several of these methods have already passed tests conducted at large experimental-industrial units. One of these is a method for obtaining sulfuric acid in an apparatus that works on the system of inserting the working mixture from alternating directions. This method is meeting with success at the scientific-manufacturing "Minudobreniye" Association and at an association of the same name in the city of Voskresensk. Preparations are already being made for the design and construction of large industrial installations employing this system.

The USSR Ministry of Nonferrous Metallurgy has also become interested in new methods for sulfuric acid production. The utilization of waste product gases is impossible with traditional methods because the concentration of sulfur dioxide is so low that no useful components can be extracted.

Plans have already been drawn and preparations for construction of new industrial units have begun for combines in Krasnoural'sk and Noril'sk. Production should begin as early as 1982. Utilization of the new method in nonferrous metallurgy will provide means for producing an extra several million tons of inexpensive sulfuric acid per year; and even more important, air pollution by this harmful gas will also be eliminated.

The Institute of Catalysis is working with the State Institute of the Nitrogen Industry to come up with a process for synthesizing ammonia, using "nonstationary" technology. Ammonia is used as a base for making nitric mineral fertilizers. This will help reduce construction costs and will utilize practically all the heat from the chemical reaction.

The Institute of Catalysis has also begun working with the Scientific Research and Planning Institute for Sulfur, in L'vov, on obtaining sulfur from hydrogen sulfide.

The Institute of Catalysis is working with many institutes and organizations of the ministries of the metallurgical and chemical industries in developing nonstationary methods for inexpensive detoxification of gaseous waste products that contain carbonic acid, sulfur dioxide, acetone, methanol, formaldehyde, and many other chemical compounds. Among these organizations, we should mention the Special Design-Technology Bureau of Catalysts (in Novosibirsk), the inter-industry coordinating scientific research laboratory for environmental protection of the Ministry of the Chemical Industry, Tekhenergokhimprom (in Novosibirsk), and the Novosibirsk medical preparations factory. Systems for complex purification of gases for the Chelyabinsk metallurgical factory and the Magnitogorsk metallurgical combine have been developed with the energy purification section of Scientific Research and Planning Institute of Ferrous Metallurgy. These systems do not require heat to warm up the gases so a large amount of valuable metal can be conserved, since no heat transformers are needed.

Apparatuses designed for nonstationary processes will have broad applications in industry through the utilization of heat from the chemical reactions.

New catalytic methods will help limit irretrievable heat loss in various branches of the national economy.

Work on the practical applications of nonstationary processes has just begun, but already it is clear that for rapid and successful introduction of these methods into industry, it is essential to see to the output of fast-acting secure fittings. Our machine constructors are up to this task.

CHEMICAL PLANT UNDER CONSTRUCTION

Yerevan KOMMUNIST in Russian 15 Jun 82 p 3

[Novosti Press Agency (APN) release: "Chemical Plant Under Construction"]

[Text] A large chemical plant designed by the Japanese firm TEK is being built in Novgorod, with the collaboration of Japanese specialists directing the installation work. The plant will have a production capacity of 550,000 tons of mineral fertilizers per year. The fertilizers will have a high content of nitrogen, phosphorus and potassium. The plant will be part of the Novgorod "Azot" Association. [Above paragraph in bold face]

Oleg Shalin, Soviet director of the project, said, "The Japanese firm's design interested us because it employs a technology that does not include the use of sulfuric acid, a product that is becoming scarce. On the other hand, the nitric acid method of decomposing apatite raw material for the production of complex mineral fertilizers has a great future, since nitric acid can be obtained in practically unlimited quantities. The Takhmashimport Association for foreign trade has contracted with TEK for the construction of five such plants in our country. The Novgorod plant will begin production in the second half of this year."

APN correspondent Aleksandr Turundayevskiy asked the director of the Japanese specialists, Hayashi, who is also an engineer, how he evaluated the cooperation between the TEK firm and the USSR.

"We have had a business relationship with the Soviet Union for the last 15 years. Our firm has taken part in the design and construction of more than 40 chemical enterprises. We are satisfied with the progress of our work here in Novgorod. Eighty percent of the general construction has been completed and about half of the technological equipment has been installed. We are pleased that two ammonia production plants, built according to the same design as that for the Novgorod 'Azot' Association plant, are running smoothly."

Yuriy Ivanov, general director of the Novgorod "Azot" Association said, "The fact of our long years of cooperation with the Japanese firm, TEK, speaks for itself. We have no complaints about the equipment or the technology, and in general they are better than what is produced by other foreign firms. We plan to expand our cooperation with the Japanese."

BRIEFS

POLYMER IN PLACE OF METAL--Dzerzhinsk, Gor'kovskaya Oblast--The polymer material, black polycarbonate, is used in many branches of the national economy. It has good molding qualities, a high heat resistance, and it is resistant to many chemical substances. It is no accident that this polymer has replaced high quality metals in a number of products. The "Zarya" chemical equipment factory in Dzerzhinsk produces polycarbonate. Recently that collective achieved remarkable success by delivering to consumers material with the Emblem of Quality. This will promote high quality and reliability in all the articles the factory produces. [By SOTSIALISTICHESKAYA INDUSTRIYA correspondent V. Noskov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Jul 82 p 2] 9967

PRODUCTION CAPACITIES GROWING--Tul'skaya Oblast--The Yefremov chemical factory has put out its first tons of production. After the new sulfuric acid production reaches its projected capacity, the enterprise will supply agricultural workers with no less than one million tons of fertilizers. This does not, however, exhaust the contribution made by Yefremov chemists to realization of the food production program. This year the factory will begin manufacturing liquid complex fertilizers. Next in line is a unique production of unrecycled fodder phosphates. [By V. Anikeyev] [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 16 Jul 82 p 1] 9967

CSO: 1841/290

UDC 678.06:63

POLYMERS AND THE FOOD PROGRAM

Moscow PLASTICHESKIYE MASSY in Russian No 6, Jun 82 pp 3-5

ABRAMOV, V. V. and ZHARKOVA, N. G.

[Abstract] To fulfill Party demands for development of agriculture using all industrial and scientific means, the plastics industry has expanded the portion of its products intended for food processing from 2% in 1965 to 12% in 1981, or from 5 to 145,800 tons. This has released metals, woods and glass for other economic uses and provided corrosion resistant, lightweight equipment for many agricultural uses. Polyethylene sheeting has been developed with higher light stability for greenhouses and hothouses. These join PVC sheeting that is resistant to atmospheric conditions, and reinforced plastic sheeting for use in temporary storage structures and the like. Other important applications of plastics include pipes and hoses for soil heating, irrigation, land drainage and other liquid transport. Square pipe is made for metered bird feeding and pressure transmission of fluids. The "PLASTIK" Scientific Production Association will begin producing reinforced hoses from 6 mm to 63 mm in diameter during the current year. Packages for strength and appearance are being designed and produced for agricultural products; they will preserve taste and nutritive values of foods. A necessary area for development is in packages for sterilized, pasteurized and frozen products that will be durable during these processes. Liquid-proof paper containers are being replaced by thin low-pressure polyethylene for milk and meat products. Other development of combinations of polymers is suggested.

[266-12131]

UDC 678.06:63:69

EFFECTIVENESS AND PROSPECTS FOR USING POLYMER MATERIALS IN AGRICULTURAL CONSTRUCTION

Moscow PLASTICHESKIYE MASSY in Russian No 6, Jun 82 pp 6-7

SYTNIK, V. I., ORDYNSKAYA, T. M., MOSKVIN, D. F., CHERNYAK, I. S. and TATSIY, V. I.

[Abstract] The authors discuss replacing traditional metal, wood and concrete construction with plastics for housing poultry and animals and protecting agricultural products and fertilizers, particularly where temporary structures are feasible. Tobacco drying, sheep folds and storage of fertilizer until application are typical uses where significant savings can be achieved with no less effectiveness, using polymer thermoplastics with fiberglass reinforcement. A problem that requires solution in such structures is their short useful life due to ultraviolet ray damage; their poor insulating properties indicate use of these materials where heating is not a serious consideration. Fiberglass of phenol formaldehyde has been used for insulated panels in poultry houses, cattle pens, manure storage and mushroom chambers. With effective heating, such structures have the advantages of easy disinfection and an improved microclimate. So far, however, such structures have failed to utilize the strength of fiberglass completely, since the bearing walls are still made of traditional materials. Advances in use of fiberglass continue.
[266-12131]

UDC 678.742.2-19-416.01:537

LIGHT-STABILIZED POLYETHYLENE SHEETING WITH INCREASED ULTRAVIOLET RADIATION TRANSMISSION

Moscow PLASTICHESKIYE MASSY in Russian No 6, Jun 82 pp 7-8

VASILENOK, Yu. I., LAGUNOVA, V. N., SOLOV'YEVA, N. P., LESNYKH, O. D., YERMAKOV, Ye. I., KOTOVICH, I. N., YEMEL'YANOVA, V. A. and RUDNITSKIY, V. N.

[Abstract] Introduction of antioxidants to polyethylene sheetings used in agriculture cuts transmission of biologically-active ultraviolet radiation in the 300-330 nm range, thus hindering the tempering of seedlings. To solve this problem, the authors tested high pressure polyethylene with non-ionogenic surface-active oxyethylated octadecylamine and monoethyl amide of aliphatic acids of the C₁₀-C₁₈ fraction. The stabilizer was o,o-diphenyldithiophosphate of nickel. Industrial light stabilizer 0,05% 2-hydroxy-4-alkoxy-benzophenone does not transmit the ultraviolet rays needed for sprouting; that used in the present study greatly increased transmission of those rays, but its stabilizing capability was insufficient. The addition of non-ionogenic surface-active substances corrected this problem and transmitted as much ultraviolet light

as plain polyethylene. While the latter lasted but 3-4 months, the stabilized sheeting of the test product lasted 9 months while transmitting 60% of the desired radiation (compared to 78% for ordinary sheeting). Savings of 800-900 rubles per ton were projected. References 2 (Russian).
[266-12131]

UDC 678.742.2-405.8:631.589.2

POROUS FILM SUBSTRATE FOR SPROUTING PLANTS

Moscow PLASTICHESKIYE MASSY in Russian No 6, Jun 82 pp 8-9

YERMAKOV, Ye. I., BOGDANOV, V. S., KOTOVICH, I. N., RUDNITSKIY, V. N., LAGUNOVA, V. N., SOLOV'YEVA, N. P. and VASILENOK, Yu. I.

[Abstract] Noting that a three-dimensional medium causes difficulties in hydroponics in even feed of water, minerals and air, the authors developed a low-cost hydrophilic film based on an antistatic polymer containing ethylene homo- or copolymers and a non-ionogenic surface-active substance, with a supplementary quantity of the oxyethylated fraction of dioxine alcohols. Either a hydrophilic polyethylene or an ethylene + vinylacetate copolymer with hydrophilic additives was used. High-dispersion NaCl, Ca(NO₃)₂, KNO₃, KCl and MgSO₄ salts were used to make capillaries in the film. Results showed the flow of water and minerals using this film to be fully satisfactory for a variety of seedlings. It was tested for "Ottawa-60" tomatoes in an intensive light cultivation environment, with a resulting 46% increase in yeilds while water use was some 86% that of a control plot. References 6 (Russian).
[266-12131]

UDC 678.742.2-416.002.237.004.3

'TERMOPLEN-2,' A NEW MATERIAL FOR PACKING MINERAL FERTILIZERS

Moscow PLASTICHESKIYE MASSY in Russian No 6, Jun 82 pp 13-14

PEREPELKIN, V. P., OSTAPCHUK, S. V., YURKEVICH, V. G., NESTEROVA, N. V. and FE. OTOVA, L. P.

[Abstract] To decrease losses in fertilizer handling and transportation, the authors studied radiation-chemical modification of polyolefin packing material to preserve the desired qualities and eliminate shortcomings of the polymer, such as viscosity, cracking and damage by organic solvents. The radiation modification permitted use of thinner films and cheaper polymers for heat-, frost- and waterproof packaging. The fertilizer sacks produced proved to be more durable than those in a control group, with less weight and thickness. The authors project savings for packaging fertilizers in the USSR at 5.6 million rubles.
[266-12131]

UDC 678.06:63

PLASTICS FOR PRODUCING AGRICULTURAL MACHINERY PARTS

Moscow PLASTICHESKIYE MASSY in Russian No 6, Jun 82 pp 19-20

MAMEDOV, R. I., SHIBANKOV, V. M., SHEMBEL', N. L. and SIMONOV-YEMEL'YANOV, I.D.

[Abstract] The corrosion resistance and material savings potential of plastics make them highly desirable substitutes for metals in certain bearings, liquid containers, valves, fertilizer spreaders, etc. In selecting polymers, however, such factors as sun exposure and load must be considered. The "PLASTIK" and "PLASTPOLIMER" Scientific Production Associations have developed containers for fertilizer spreaders that are resistant to atmospheric and corrosive factors, using ABS-2020 modified with effective light stabilizers. An ethylene + propylene + alpha-butylene (SEP-3) copolymer proved to be the most promising combination for a fertilizer spreader for ammonium-potassium nitrate, potassium salt and superphosphate. The Moscow Institute for Precision Chemical Technology imeni M. V. Lomonosov has developed a greaseless plastic graphite bearing that has greater durability than lubricated counterparts. References 2 (Russian). [266-12131]

UDC 330.341.4.66+66.004.18

CHEMIZATION OF NATIONAL ECONOMY, AN IMPORTANT MEANS FOR CONSERVING MATERIAL, ENERGY AND HUMAN RESOURCES

Moscow ZHURNAL VSESOYUZNOGO KHMICHESKOGO OBSHCHESTVA IM. D. I. MENDELEYEVA in Russian Vol 27, No 3, May-Jun 82 pp 257-260

ROSTUNOV, V. F., chief, Administration of Science and Technology, Ministry of the Chemical Industry

[Abstract] The author reviews chemical advances as labor- and resource-conserving developments in producing capital equipment and consumer goods, agricultural packaging products, plastics and resins, mineral fertilizers and chemical means of plant protection. Other advances are in paints, synthetic oils, leather substitutes and an assortment of shipping and packaging. Plastics in construction are freeing non-ferrous metals, wood and other traditional materials. They can be produced with from 2.2 to 2.5 times less energy than corresponding metals, thus providing another saving. Chemical fibers have a similar impact on the textile industry. The quality and durability of paints and varnishes can be improved along with savings in production costs by using a variety of chemicals. Synthetic edible oils and soaps reduce the need for such products from plants and animals. The leather and clothing industries are receiving synthetic products that substitute for essentially all types of natural products.

[279-12131]

ENERGY SAVING PROCESSES IN CHEMICAL INDUSTRY

Moscow ZHURNAL VSESOYUZNOGO KHMICHESKOGO OBSHCHESTVA IM. D. I. MENDELEYEVA
in Russian Vol 27, No 3, May-Jun 82 pp 275-281

KLIMENKO, V. L., doctor of economic sciences, chief, Department of the
Economics and Organization of Chemical Production, Leningrad Technological
Institute imeni Lensovet

[Abstract] Citing the urgent need for conserving fuel and energy, the author reviews Soviet efforts to save 160-170 million rubles, as mandated by the 26th CPSU Congress. Topics include application of energy-saving technology and gradual phasing out of antiquated, wasteful equipment, increased use of diesel engines, use of secondary energy resources and application of new methods of generating electrical energy. Estimates show that the Soviet chemical and petrochemical industries use 13.1% of the country's fuel and energy resources to produce about 7% of its industrial goods. Ways of perfecting technology to decrease energy consumption include optimal choice of raw materials, use of improved catalysts and more effective methods for obtaining finished physico-chemical products, and wide application of combined chemical processes, equipment and products where one process yields two or more useful products. Examples of the latter are oxosynthesis of aldehydes along with hydration to obtain both aldehydes and alcohols for various uses, and combining processes for obtaining phosphorus from phosphorites and phosphoric acid so that the heat produced by phosphorus oxidation can be used in reducing the phosphorus. The author also calls for use of improved equipment and progressive methods of accounting and utilization. Improved use of energy resources involves maximizing use of byproducts and secondary energy, from such sources as waste furnace gasses, steam from rectification columns, heat from cooling water or distilling liquids, slag and burning waste, etc. Organizational needs are also discussed. Figures 2; references 12: 11 Russian, 1 German.

[279-12131]

COMBUSTION

UDC 543.461:662.767

STRUCTURE OF HEXANE FLAME FRONT

Moscow KHIMICHESKAYA FIZIKA in Russian No 6, Jun 82 (manuscript received 28 Sep 81) pp 838-841

MANZHOS, V. K., KOLESNIKOV, B. Ya. and KSANDOPULO, G. I., Kazan' State University imeni S. M. Kirov, Alma-Ata

[Abstract] Results of this study with hexane, in accordance with those of a previous study using propane, indicate that the main chemical reactions causing fuel breakdown occur not in the luminous portion but in the cooler darker zone of the flame. The entire combustion zone is about 3 mm long and increases with increasing carbon number of the hydrocarbon fuel. The carbon chain-length, however, is only one of several factors controlling the flame width. Plots of various parameters across the flame zone show the following (the zero point is considered to be the internal boundary of the luminous zone; distance is considered positive in the direction of increased combustion): Oxygen concentration becomes zero at about 0.3 mm; water and CO₂ reach a maximum about 0.5 mm and remain high. H₂, CH₄, C₂H₂, C₂H₄ and HCHO peak about -0.2 mm then decrease. The higher hydrocarbon homologs peak earlier in the zone: C₂H₆ at about -0.7 mm; C₃H₆ and C₃H₈ at about -1.2 mm. C₆H₁₄ decreases to zero at about -0.3 mm. Calculated hydrogen atom concentrations in the cooler portion of the flame are on the order of 10¹⁴ particles/cm³. Figures 2; references 9 (Russian).

[245-12027]

UDC 541.126

PROPAGATION OF LAMINAR FLAMES: ROLE OF H₂O₂ IN H₂-O₂ COMBUSTION SYSTEMS

Moscow KHIMICHESKAYA FIZIKA in Russian No 6, Jun 82 (manuscript received 24 Nov 81) pp 842-847

BASEVICH, V. Ye., BELYAYEV, A. A. and POSVYANSKIY, V. S., Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] A standard program is developed which provides for a very simple entry of different reaction mechanisms as a system of second-order differential equations. This permits a large body of experimental data to be used efficiently.

An equation is developed for the heat evolution and its change as a function of temperature. For the H₂-O₂ system, fifteen different reactions are considered. Pre-exponential factors A and activation energies E are listed for the forward and reverse reactions. Three specific cases are considered: i) a system of reactions not involving H₂O₂ (9 of the 15 listed reactions); ii) a system of reactions including only those which involve H₂O₂ (6 of the listed reactions); and iii) a system including all 15 listed reactions. In general, the formation of hydrogen peroxide in lean hydrogen-air mixtures decreases the concentration of active centers. Figures 2; references 18: 9 Russian, 9 Western.

[245-12027]

UDC 534.222.2

DETONATION LIMITS OF FUEL-AIR MIXTURES IN SMOOTH AND ROUGH PIPES

Moscow KHIMICHESKAYA FIZIKA in Russian No 6, Jun 82 (manuscript received 29 Dec 81) pp 848-853

BORISOV, A. A., GEL'FAND, B. Ye., LOBAN', S. A (deceased), MAILKOV, A. Ye. and KHOMIK, S. V., Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] The experimental study considered the effect of tube diameter and the composition of a propane-oxygen mixture on the detonation velocity, the concentration limits required for detonation and the wave structure. For H₂, CH₄, C₂H₄, C₃H₆, C₃H₈ and acetone, decreasing the fuel in lean mixtures or the oxygen in rich mixtures changes the detonation process from stationary to "knocking" [tn:literally "galloping"]. Both stable and unstable regimes are investigated. The range of concentrations capable of detonation and the rate of detonation decrease with increasing smoothness of the pipe. Conversely, the combustion rate of a turbulent mixture increases with increasing smoothness, leading to the rapid formation of a strong shock wave across the flame front. Of theoretical interest is that the detonation limit is only a weak function of both the activation energy and the diameter of the pipe (for diameters greater than a certain minimum value). Figures 6; references 7: 4 Russian, 3 Western.

[245-12027]

ACCELERATING COMBUSTION IN GAS MIXTURES

Moscow KHIMICHESKAYA FIZIKA in Russian No 6, Jun 82 (manuscript received 2 Dec 81) pp 854-858

GOREV, V. A. and MIROSHNIKOV, S. N., Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] Flame propagation around a turbulence-inducing screen obstacle was studied during the combustion of stoichiometric mixtures of oxygen or air with hydrogen. The flame, after passing through the screen and travelling a distance equal to about twice the screen radius, had a burning rate which was stable but greater than the initial rate. Increasing the gage of the wire, decreasing the size of the screen apertures and increasing the size of the screen caused the flame to accelerate. The maximum rate of combustion for the H₂-air mixture after the screen was 250 m/sec; the H₂-O₂ mixture detonated. Figures 3; references 8: 5 Russia., 3 Western.

[245-12027]

FERTILIZERS

UDC 633.72:546.711/.717

USING FERTILIZERS CONTAINING MANGANESE ON TEA PLANTATIONS

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 5, May 82 pp 20-24

GODZIASHVILI, B. A., candidate of agricultural sciences, and CHEBOTAREVA, M. V., Chakvaidy Branch, All-Union Scientific Research Institute for Tea and Sugar Crops

[Abstract] Fertilizers have long been used to increase tea and citrus yields in the red soils of humid, subtropical western Georgia, but acid ammonia salts have brought increasing acidity to those soils and freed bases. With annual nitrogen, phosphorus and potassium fertilizer ion, microelements have come to be limiting factors that affect yields. The authors studied bound and free manganese in the soil in relation to pH and current fertilizer applications, on one of the oldest tea-growing sovkhozes in the area. Free manganese content was 3.4, 8.5 mg or merely traces per 100 g of soil. While manganese sulfate had a positive effect on soil in only trace amounts, it had less benefit where the soil contained 3.4 mg, and it suppressed growth in soil with 8.5 mg of manganese. Manganese content in tea leaves correlated with Mn content in the soil. Results pointed to the need for careful monitoring of manganese content before administering fertilizers on tea plantations. References 12: 11 Russian and 1 Western (by Soviet authors).

[258-12131]

UDC 631.811.941:633.3

USING COPPER SULFATE AS A MICROFERTILIZER FOR BARLEY, FODDER BEANS AND CORN IN KALININGRAD OBLAST

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 5, May 82 pp 24-28

PANASIN, V. I., candidate of agricultural sciences, and SHIROKOV, V. V., Kaliningrad Oblast Planning and Research Station for Agrichemical Chemicalization

[Abstract] Soils in the Kaliningrad area include soddy podzolic, alluvial, alluvial-marshy and peat bog types. The authors studied the effects of copper sulfate on the title crops on each of these soils, in variants ranging from

2 to 8 kg per hectare and applications directly to the soil, as a presoak for seeds and as a spray on plants. In all cases positive results were registered, with variations related to previous cooper content of each particular soil type, as well as to peculiarities of the soils. Alluvial-marshy and peat bog soils reacted favorably to the fertilizer despite initially high content of free copper. The volume of the plowed soil layer and humus amounts also affected results. Application levels are recommended for soils with up to 12 kg/ha free copper content before fertilization; above that level, fertilizers containing copper are ineffective. The positive effects of copper-containing fertilizers on protein and amino-acid content were also related to soil type and the individual crop being tested. Both application to the soil and soaking of seeds were effective, but plant spraying was not. The net gain per ruble expenditure ranged from 2.08 rubles to 10.96 rubles.

[258-12131]

UDC 631.83+631.85

USING POTASSIUM AND PHOSPHORUS FERTILIZERS ON IRRIGATED GRASS PASTURES IN THE NON-CHERNOZEM ZONE

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 5, May 82 pp 31-33

KULAKOV, V. A., candidate of agricultural sciences, and BALAYEVA, O. M., All-Union Scientific Research Institute for Feeds imeni V. R. Vil'yams

[Abstract] While recognizing the need for complete fertilizers on pastureland, the authors note that high-powered phosphorus fertilizers can reduce micro-element contents. To determine optimum applications, they conducted field tests at the Institute's Central Experimental Base (Moscow Oblast) on pasture containing orchard grass, timothy and fescue varieties, with 70-100% moisture content of the soil, a soddy podzolic moderately loamy type. In 1970 five tons of lime per hectare had been applied. Measurements before and after application of potassium chloride indicated that the pasture's productivity was directly tied to the amount of free potassium in the soil, but if content surpassed 10 mg of K₂O per 100 g, the grasses utilized it erratically, with no increases in yield but merely accumulation of the mineral, accompanied by losses in calcium. It was determined that N₃₀₀P₆₀K₁₅₀ was the most beneficial application, providing 9-9.6 thousand feed-units per hectare. References 5 (Russian).

[258-12131]

UDC 631.83

DISSOLUTION RATE OF ENCAPSULATED FERTILIZERS

Minsk VESTSI AKADEMII NAVUK BSSR: SERYYA KHIMICHNYKH NAVUK in Russian
No 3, May-Jun 82 (manuscript received 19 Mar 81) pp 98-102

OVSEYENKO, L. V., KORSHUK, E. F., ALEKSANDROVICH, Kh. M., Institute of General
and Inorganic Chemistry, Belorussian Academy of Sciences

[Abstract] A study is made of the effect of treating granulated nitrogen fertilizers with various individual compounds and complex compositions -- including those produced in processing of various chemical production wastes -- with hydrophobicizing and film-forming properties, on the kinetics of dissolution of the nutrients in those fertilizers. A charge of urea was treated by spraying the granules with solutions of low molecular polystyrene, urea-formaldehyde resins (produced by joint condensation of urea and formaldehyde with the addition of a third component as a hardener), M-2 hardener and a saturated solution of copper sulfate in a quantity of 10% of the mass of the fertilizer. Treatment time varied from 5 hours to 30 minutes. The specimens were dried at 110°C and the treatment was repeated to produce multilayer coatings. The rate of dissolution of urea coated with a continuous film of a polystyrene melt was much lower than urea treated with a solution of polystyrene in chloroform, a result of the presence of capillaries formed upon evaporation of the solvent chloroform. Figures 2; references 5 Russian.

[282-6508]

UDC 631.81.003+658.56

DIRECTIONS FOR INTENSIFYING MINERAL FERTILIZER PRODUCTION AND IMPROVING QUALITY

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IM. D. I. MENDELEYEVA
in Russian Vol 27, No 3, May-Jun 82 pp 250-256

MEN'SHOV, V. N., chief of Administration of Science and Technology, Ministry
of Mineral Fertilizer Production

[Abstract] The author reviews past and projected efforts in producing fertilizer in the light of resolutions of the 26th CPSU Congress. Chemical means of plant protection are expected to increase harvests and raise labor productivity 30%. Soviet mineral fertilizer production has more than tripled, to 24.8 million tons, from 1965 to 1980. Further increases are planned, with special emphasis on chemical means of plant protection. Major investments are planned for expansion, reconstruction and technical reequipping of enterprises, rather than for new plants. A technical objective is fertilizer with balanced nitrogen, phosphorus and potassium content. Phosphorites from the Yegor'yev, Verkhnekamsk and Polpinsky deposits are basic sources for non-chernozem fertilizing, but other concentrated complex fertilizers, including

superphosphates, are being developed. By-product fertilizers with low content of needed minerals but good economic effects are also being produced, with the product mix including by-products along with high quality "ammophos," "nitroammophoska" and "kristallin." Phosphates for animal feed are also being stressed. Liquid complex fertilizers such as 10:34:0 and anhydrous ammonia, and products containing trace elements of copper, zinc, manganese, cobalt, iodine and molybdenum represent other directions of development. Major efforts are also being directed at better shipping, handling and storage parameters for bulk fertilizers. Low-quality but abundant phosphates from the Karatau basin are being exploited, as is natural sulfur. Automation is being advanced.

References 4 (Russian).

[279-12131]

ORGANOMETALLIC COMPOUNDS

UDC 547.491.8.07/088.8/

REACTION OF CYANAMINO-sim-TRIAZENSE WITH HALOGEN NITRILES

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 35, No 5, May 82
(manuscript received 25 Mar 81) pp 322-325

DOVLATYAN, V. V., GYUL'BUDAGYAN, L. L. and AMBARTSUMYAN, E. N., Armenian Agricultural Institute

[Abstract] A study was made of the interaction of potassium salts of N-cyanamino-4,6-substituted-sim-triazenes with chloronitriles and methylchloroacetate. It was found that these salts (I) yield with chloroacetonitrile and methylchloroacetate products of nucleophilic substitution (II, III), while with a α , β -dichloropropionitrile they yield products of dehydrochlorination. The interaction of certain I salts with sodium iodoacetate was studied. It was found that the reaction occurs smoothly and forms N-cyano-N-carboxymethyl derivatives in dimethylformamide or dimethylsulfoxide. References 4 (Russian).

[280-6508]

UDC 541.49+547.26.118

THERMODYNAMIC PARAMETERS OF FORMATION OF NICKEL COMPLEXES WITH DITHIOACIDS OF PHOSPHORUS

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 52, No 6, Jun 82
(manuscript received 23 Oct 81) pp 1323-1324

OVCHINNIKOV, V. V., GARIFZYANOV, A. R., TOROPOVA, V. F. and CHERKASOV, R. A., Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] The stability of chelate nickel complexes in which the ligands are derivatives of ABPSS⁻ dithioacids of phosphorus was shown earlier to depend on the spatial and electronic structure of the A and B substituents. The thermodynamics of such reactions have not been covered. The authors determined the contributions of enthalpic and entropic components in the overall free energy of complex formation. The calorimetric data show that complexes

formed by nickel ions and anions of acyclical and cyclical dithiophosphates, and complexes with derivatives of dithiophosphoric acids, are generally characterized by lesser amounts of enthalpy and entropy of complex formation than found in complexes with dithiophosphinate ligands. Dithio-phosphates, phosphonates and phosphinates of nickel are judged to belong to different reaction series. References 8: 6 Russian, 2 English.
[382-12131]

UDC 547.245'246'258.11'81'491.8

SYNTHESIS OF BIS-(η^5 -CYCLOPENTADIENYL) VANADIUM DIALLYLISOCYANURATE

Leningrad ZHURNAL OBSHCHEY KHMII in Russian Vol 52, No 6, Jun 82
(manuscript received 13 Jul 81) pp 1334-1338

RAZUVAYEV, G. A., GORDETSEV, A. S., LATYAYEVA, V. N., PERESHEIN, V. V., MOROZOV, O. S. and DERGUNOV, Yu. I., Gor'kiy Medical Institute imeni S. M. Kirov

[Abstract] Earlier, the authors had synthesized derivatives of diallylisocyanurate containing silicon, germanium and tin, and determined that R_3Si fragments combined with the symmetrical triazine cycle through the oxygen atom, while R_3Ge and R_3Sn groups coordinated through the nitrogen atom. To obtain vanadium compounds with the triazine ring and study the fate of the Cp_2V fragment, they conducted reactions of dicyclopentadienylvanadium with trimethylsilyl-, dimethylsilyl-, triethylgermyl- and tributylstannylallylisocyanurates. The basic product of all reactions was the same, dicyclopentadienylvanadium allylisocyanurate. Its properties are described. Chemical procedures are given in the experimental section. References 6: 3 Russian, 3 Western.
[283-12131]

ORGANOPHOSPHORUS COMPOUNDS

UDC 547.341+547.544.3

[(HYDROXYDIPHENYLPHOSPHORANILIDENE)TOSYLMETHYL]TRIPHENYLPHOSPHONIUM BROMIDE: STABLE ILIDE WITH HYDROXYL GROUP AT THE PHOSPHORUS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 264, No 6, Jun 82
(manuscript received 10 Mar 82) pp 1396-1399

MASTRYUKOVA, T. A., ALADZHEVA, I. M., BYKHOVSKAYA, O. V., PETROVSKIY, P. V.,
ANTIPIN, M. Yu., STRUCHKOV, Yu. T. and KABACHNIK, M. I., academician, Institute
of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences,
Moscow

[Abstract] A study is made of the synthesis and crystalline structure of the
first stable acyclic compound with a hydroxyilide group. The hydroxyilide
was obtained with a yield of 92% by the action of an equivalent quantity of
hydrogen bromide in ether on a conjugate phosphine oxide base which in turn
was synthesized by oxidation . [(diphenylphosphino)tosylmethylenetriphenyl-
phosphorane with potassium permanganate in a CH_2Cl_2 -acetone mixture. The
structure of the end product was verified by spectral studies and X-ray
structural analysis. Figure 1; references 15: 8 Russian, 7 Western.
[268-6508]

UDC 541.49:542.943

OXIDIZING TRIPHENYLPHOSPHINE IN PRESENCE OF TRANSITION METAL COMPOUNDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 6, Jun 82
(manuscript received 10 Dec 81) pp 1257-1260

FEDIN, V. P. and ROMANOVA, I. B., Institute of Biochemistry and Physiology
of Microorganisms, USSR Academy of Sciences, Pushchino

[Abstract] There is a widely held hypothesis about the intermediate formation
of a double bond iron-oxygen fragment to explain mono-oxidase activity of
enzymes. The authors studied oxidation of triphenylphosphine (PPh_3) with
such niobium and molybdenum fragments, and also with atmospheric oxygen in the
presence of transitional metals. PPh_2 oxidizes well using nioboceneoxochloride

in an equal quantity of sodium naphthaline, with a good yield of triphenylphosphine oxide and bis-niobocene. The reaction with niobium complexes was conducted under vacuum in solvents from which gas was carefully removed, thus controlling the effect of atmospheric oxygen on the reaction. With atmospheric oxygen, niobocenechloride and PPh_3 unexpectedly yielded niobocenoxochloride and an oxide of triphenylphosphine. Modeling of monooxygenase enzymes containing cytochrome "P-450" as a prosthetic group was conducted on porphyrine complexes of transitional metals, yielding $\text{O}=\text{Mo}(\text{OCH}_3) \cdot (\text{L})(\text{VII}) \text{ LH}_2$ -mesoporphyrine (IX)-dimethyl ester, showing that that complex also oxidises PPh_3 with transfer of an oxygen atom from the oxocomplex to the substrate. In the presence of small quantities of $\text{Cu}(\text{OCOCH}_3)_2$, hemin or $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$ and equal amounts of ascorbic acid, catalytic oxidation of PPh_3 by atmospheric oxygen is possible.

References 11: 5 Russian, 6 Western.
[283-12131]

UDC 547.341

COMBINATION OF PHOSPHORUS TRIHALOGENIDES WITH METALLIZED INETHERS

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 52, No 6, Jun 82
(manuscript received 14 Dec 81) pp 1431-1432

LUZIKOVA, Ye. V., KAZANKOVA, M. A. and LUTSENKO, I. F., Moscow State University imeni M. V. Lomonosov

[Abstract] Continuing previous research, the authors studied the reaction of phosphorus trichlorides and tribromides with trimethylsilyl(germyl)alkoxyacetylenes [the title inethers]. The reactions were new examples of combining phosphorus trihalogenides by short bonds, leading to new types of bis-elemental organic compounds, dihalogen 1-trimethylsilyl(germyl)-2-halogen-2-alkoxyethenyl phosphines. The products obtained were confirmed by PMR and ^{13}C NMR, and structures by infrared and ^1H and ^{31}P NMR spectra. Reference 1 (Russian).

[283-12131]

UDC 547.298.u

REACTION OF HYDRAZINE WITH ESTERS OF PHOSPHORYLATED PHENYLCARBOXYLIC ACIDS

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 52, No 6, Jun 82
(manuscript received 30 Dec 81) pp 1436-1437

ISMAGILOV, R. K., RAZUMOV, A. I. and BEZBORODOVA, T. A., Kazan' Chemical Technological Institute imeni S. M. Kirov

[Abstract] Studying methods of synthesizing the title compounds, the authors investigated anhydrous hydrazine's reaction with ethyl esters of alpha, α -diphenylphosphonylphenylacetic and alpha-diphenylphosphonyl-beta-phenylpropionic acids. With an excess of hydrazine and 125-130°C temperatures, the

phosphorus-carbon bond was broken, leading to formation of a hydrazide of diphenylphosphonous acid and N,N'-bisphenylacetylhydra ine, with the first ester, and a hydrazide of the corresponding acid with the second. An attempt to produce a hydrazide by reaction of the second ester with hydrazine hydrate failed. Chemical procedures are given. References 4: 1 Russian, 3 Western. [283-12131]

UDC 547.298.3

PHOSPHAZOCOMPOUNDS WITH UNLIKE HALOGENS ON PHOSPHORUS ATOM

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 52, No 6, Jun 82
(manuscript received 31 Jul 81) pp 1260-1265

GOLOLOBOV, Yu. G., GUSAR', N. I. and RANDINA, L. V., Institute of Organic Chemistry, UkrSSR Academy of Sciences

[Abstract] The title compounds are of interest in studying reaction mechanisms and also as intermediate products in the synthesis of such compounds as poly-phosphazenes. The authors synthesized dihalogen phosphazocompounds containing a tertiary butyl group at the phosphorus and a trimethylsilyl radical at the nitrogen. Halogenation of phosphines led to expected corresponding chlorine, bromine and iodine compounds, whose structure was confirmed by infrared and ^{31}P NMR spectral data. They were stable when heated. At room temperature symmetrical phosphazocompounds formed. When bromophosphine was mixed with phosphazosilane, a rapid halogen exchange took place at room temperature. The results indicated that the most likely path for forming these compounds led through phosphonium salts, but no certain proof was obtained. Chemical procedures are given in the experimental section. References 7: 4 Russian, 3 Western.

[283-12131]

UDC 542.91:547.1'118

STRUCTURE OF ACYLATED AND BENZOYLATED DERIVATIVES OF TRIMETHYL ESTER OF PHOSPHOACETIC ACID

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 52, No 6, Jun 82
(manuscript received 23 Oct 81) pp 1265-1270

SAKHIBULLINA, V. G., POLEZHAYEVA, N. A. and ARBUZOV, B. A., Scientific Research Chemical Institute imeni A. M. Butlerov; Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] Previously, the authors had shown that the direction of acylation of metallic derivatives of the title ester depended on the nature of the metal and acylating agent. Study of keto-enol tautomerism showed that acylated

products were heavily enolized and consisted of ketone, E-enol and K-enol forms in solution. Their structures were studied by PMR and ultraviolet spectroscopy. In contrast to reactions with acetyl chloride, benzoyl chloride and n-nitrobenzoyl chloride reacted with sodium and methoxymagnesium derivatives of the title ester to form mono- and di-C-aroyleted products. With n-nitrobenzoyl chloride, the dominating tendency was to form a diaroyleted product. Among products of the tests the trimethyl ester of phosphonoacetoacetic acid underwent increased enolation when water or alcohol was replaced by isoctane. The analogous ester of phosphonobenzoylacetic acid existed only in ketone form. The lack of enolation of monobenzoylated derivatives of the phosphonoacetic ester gave evidence of the thermodynamic disadvantages of the enol form compared to the ketone form, apparently due to steric factors. Chemical procedures are given in the experimental section. References 9: 6 Russian, 3 Western.
[283-12131]

UDC 547.241+547.33

REACTION OF ARYL ESTERS OF DIPHENYLPHOSPHONOUS ACID WITH 1-NITRO-1-PROPENE

Leningrad ZHURNAL OБSHCHEY KHIMII in Russian Vol 52, No 6, Jun 82
(manuscript received 15 Sep 81) pp 1270-1277

GAREYEV, R. D., IL'YASOV, A. V., LEVIN, Ya. A., GOL'DFARB, E. I., MOROZOV, V. I., LOGINOVA, G. M., SHERMERGORN, I. M. and PUDOVIK, A. N., Kazan' Veterinary Institute imeni N. E. Bauman; Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] According to the general course of full esters of trivalent phosphorus acids reacting with 1-nitro-1-alkenes, each reagent in a balanced system is involved and the direction is determined by their respective reactive capabilities. Phosphoranes are generally unstable substances that can be isolated in mild reactions. Their behavior as cyclic derivatives of nitronic acids containing phosphorus is determined by a phosphorus atom in the alkoxy group. The authors sought to find a means of stabilizing such phosphoranes in the reaction of O-phenyldiphenylphosphinite with 1-nitro-1-propene at temperatures of no more than 30-35°C. The products of the reaction were confirmed by infrared and PMR spectroscopy, ^{31}P NMR, gel-liquid and thin layer chromatography. In similar reactions, they discovered a new direction as 1-nitro-1-propene reacted with O-aryldiphenylphosphinites, in which electrophile unsaturated reagents brought formation of oxides of diphenyl-alpha-cyanethylphosphine, O-aryldiphenylphosphinates and corresponding phenols. Reactions of O-aryldiphenylphosphinites with 1-nitro-1-propene included intermediate formation of an ion-radical pair via single electron transfer. The competition of phosphorane disintegration with the breaking of exo- and endocyclic P-O bonds with an aryl substituent sees the former take precedence. Chemical procedures are given in the experimental section. Figures 2; references 19: 15 Russian, 5 Western.

[283-12131]

UDC 547.241+547.33

REACTIONS OF ALKYL ESTERS OF DIPHENYLPHOSPHONOUS ACID WITH 1-NITRO-1-ALKENES

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 52, No 6, Jun 82
(manuscript received 14 Sep 81) pp 1278-1290

GAREYEV, R. D., IL'YASOV, A. V., LEVIN, Ya. A., GOL'DFARB, E. E., MOROZOV, V. I., SHERMERGORN, I. M. and PUDOVIK, A. N., Kazan' Veterinary Institute imeni N. E. Bauman; Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] Previously, the authors had established that in reactions of full esters of trivalent phosphorus acids with 1-nitro-1-alkenes, several directions of reaction take place and result in various mixtures. In the present study they give results of the title reactions, confirming results by infrared, PMR and ^{31}P NMR spectroscopy and thin layer chromatography. Phosphorane 2-methoxy-2,2-diphenyl-3-methyl-5-oxo-1,5,2-oxazophosphol-4-ene was unstable in thermal action and at its melting point, while in aprotic solvents such as benzene, acetonitrile and dimethylsulfoxide and mild conditions, it formed other compounds rapidly. Homolytic stages in the reaction of 0-methyldiphenylphosphinite with 1-nitro-1-propene at room temperatures and isomerization indicated a formation through radical pairs, with transfer of a single electron. Electron spin resonance pointed to formation of an anion-radical in the presence of 2-methyl-2-nitroisopropane. Formation of diphenylisopropenylphosphinoxide is explained by a protoproton shift in the zwitter ion and breaking of the C-N bond in the ilide obtained, with expulsion of a nitrite anion and a subsequent reaction like the second stage of the Arbuzov regrouping. The phosphorane apparently is a kinetically-controlled product of cyclization accompanied by a more favorable stereoisomer (with better thermodynamics). Chemical procedures are given in the experimental section. Figures 5; references 19: 10 Russian, 9 Western.

[283-12131]

UDC 547.26'118

REACTION OF ISOCYANATES AND ISOTHIOCYANATES OF DIMETHYLPHOSPHOROUS AND ALKYLENEPHOSPHOROUS ACIDS WITH ALKYLIDENECYANACETIC ESTERS AND TEHYLIDENEACETYL ACETONE

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 52, No 6, Jun 82
(manuscript received 26 Aug 81) pp 1290-1296

KONOVALOVA, I. V., MIKHAYLOVA, N. V., BURNAYEVA, L. A. and PUDOVIK, A. N., Kazak' State University imeni V. I. Ul'yanov-Lenin

[Abstract] Recently, the authors showed that the title compounds reacted with unsaturated compounds when the C=C bond was activated by two strong himinal electron acceptor groups. Continuing that work, they studied the reactions

of dimethyl esters of isocyanato- and isothiocyanatophosphorous acid with idene derivatives of cyanacetic ester $R^1R^2C=C(CN)COOC_2H_5$. Adduct structures were confirmed by infrared and ^{31}P and 1H NMR using the difference $^1H-(^{31}P)$. Data confirmed the earlier course of the reaction. The most typical spectra came from the reaction of dimethylisocyanatophosphate with ethylidenecyanacetic ester. An azaphospholene and other products were also analyzed. Little heat ($50^\circ C$) or retention at room temperature was necessary for the reactions. Spyrophosphanes obtained were unstable and decomposed even during PMR spectral recording. The compounds obtained were 3,3-disubstituted 1-methyl-2-methoxy-2,5-dioxy-4-cyano-4-ethoxycarbonyl-1,2-azaphospholane (80%) and 3,3-disubstituted 2,5-dimethoxy-2-oxo-4-cyano-4-ethoxycarbonyl-1,2-azaphosphol-5-enes (20%). Dimethylisothiocyanatophosphite reacted with corresponding alylideneacetic esters to form only 3,3-disubstituted 2-methoxy-5-methylthio-2-oxo-4-cyano-4-ethoxycarbonyl-1,2-azaphosphol-5-enes, while cyclic isocyanatophosphites reacted with ethylideneacetyl acetone to form unstable 7,7,8,8-tetrasubstituted 3-acetyl-5-isocyanato-2,4-dimethyl-1,6,9-trioxa-5-lambda⁵-phosphon-2-enes. References 8: 6 Russian, 2 Western.
[283-12131]

UDC 547.341

REACTIONS OF DIPHENYL- AND PHENYLETHOXYMETHYLENE AMIDOPHOSPHITES WITH ALLENYL PHOSPHONATES

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 52, No 6, Jun 82
(manuscript received 21 Jul 81) pp 1296-1301

KHUSAINOVA, N. G., BREDIKHINA, Z. A. and PUDOVIK, A. N., Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] Cyclocombination of phosphorus-containing 1,3-dipoles and unsaturated compounds is a convenient method for synthesizing five-membered phosphorylated heterocycles. The title systems had not previously been studied. The authors investigated reactions of diphenylmethylamidophosphites with gamma-gamma-dimethylallenylphosphonates and cyclohexylidinevinylphosphates, obtaining unstable 2,2-dialkoxy-3-alkylideno-4-dialkylphosphono-5,5-diphenyl-1,2-azaphospholenes. Their conversion to azaphospholidines was accompanied by separation of alcohol. The tendency to hydrolytic separation of the P=N bond, noted previously, was confirmed as acyclic derivatives formed. Addition of water to the heterocyclic compounds brought formation of various monoesters. Phenylethoxymethylene amidophosphite was found to combine with allenyl phosphites forming unstable five-membered heterocycles, which were stabilized after N-alkylation and separation of alcohol. Chemical procedures are given in the experimental section. References 10: 6 Russian, 4 Western.
[283-12131]

UDC 547.794.2'118

ALCOHOLYSIS OF SEVERAL 4,5-BENZO-1,3,2-DIHETEROPHOSPHOLANES

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 52, No 6, Jun 82
(manuscript received 23 Oct 81) pp 1302-1307

PUDOVIK, M. A., TERENT'YEVA, S. A., MIKHAYLOV, Yu. B. and PUDOVIK, A. N.,
Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan'
Branch, USSR Academy of Sciences

[Abstract] Studying reactions of 2-ethyl-4,5-benzo-1,3,2-oxazophosphane with alcohols, phenols, mercaptans and carboxylic acids, the authors previously fixed monocyclic phosphoranes with P-H bonds. This suggested that with proton donors, the title compounds would form intermediate phosphorane derivatives. The authors studied such reactions and monitored their results with ^{31}P NMR. 2-ethoxy- and 2-methoxy-4,5-benzo-1,3,2-oxazophospholanes reacted readily with alcohol at room temperature forming complete phosphites and spirophosphorane with a P-H bond, and emitting ortho-aminophenol. They could be fixed spectrally before their disintegration into final products. 2-ethoxy-4,5-benzo-1,3,2-thiaphospholane reacted with ethanol when heated to produce triethylphosphite and aminothiophenol, which then reacted to form diethylphosphorous acid. Alcoholysis of 2-diethylamino-3-methyl-4,5-benzo-1,3,2-thiazaphospholane and thiazaphospholane in acid catalysis speeded reactions, while base catalysts slowed the alcoholysis. With 2-ethoxy-1,3,2-dioxaphospholane, basic catalysts speeded the reaction. Thus the nature of the cyclic fragment at the phosphorus affects the mechanism of the reaction. Chemical procedures are given in the experimental section. References 11: 7 Russian, 4 Western.

[8 -12131]

UDC 547.241

P-HALOGEN PHOSPHONIUM ALKYLIDES, PART 4: REACTIONS WITH AMIDES OF CARBOXYLIC, SULFO- AND PHOSPHORIC ACIDS

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 52, No 6, Jun 82
(manuscript received 31 Jul 81) pp 1314-1318

KOLODYAZHNYY, O. I., Institute of Organic Chemistry, UkrSSR Academy of Sciences

[Abstract] To further study new, highly reactive P-chlorophosphonium alkylides, the authors brought them into reactions with the title acids. With carboxylic acid amides, they behaved like chlorinating and dehydrating agents. With N-monosubstituted benzoic acid amides, they formed amidochlorides and phosphinoxides, with transfer of chlorine and oxygen atoms (together with hydrogen) between ilide and amide. Imidoylchlorides were readily dehydrochlorinating bases, so that primary amides of carboxylic acids converted into nitriles. N,N'-disubstituted ureas reacted with P-chlorylides to form carbodiimides.

Chlorinating and dehydrating properties of P-chlorylides were lacking in triphenylphosphonium ilides. The structures of the compounds obtained were confirmed by ^{31}P NMR spectra. Chemical procedures for these and other reactions are given in the experimental section. References 18: 7 Russian, 11 Western.

[283-12131]

UDC 547.241

STUDY OF REACTIONS OF COMPOUNDS OF CHLOROPHOSPHONIUM WITH HALOGENIDE ANIONS

Leningrad ZHURNAL OBSHCHEY KHMII in Russian Vol 52, No 6, Jun 82
(manuscript received 6 Jul 81) pp 1318-1322

VENGEL'NIKOVA, V. N., TOMOKHIN, B. V., KALABINA, A. V. and DONSKIKH, V. I., Irkutsk State University imeni A.A. Zhdanov

[Abstract] Continuing a systematic study of halogenophile conversions of chlorides of tetracoordinated phosphorus, the authors studied reactions of derivatives like $\text{R}_n\text{PCl}_{4-n}^+ \text{X}^-$ with halide salts of ammonium and alkaline metals as donors. Among results, tetrachlorophosphonium of tetrachloroaluminate did not react with potassium iodide. It was expected that introducing n-donors into the reaction would reduce electrophile properties of the halogen compounds formed, enabling reduction of the chlorophosphonium substrate by the effects of halogenide anions. Actually in the reaction of $\text{PCl}_4^+ \text{AlCl}_4^-$ with potassium iodide in the presence of triethylamine or dioxane, a phosphorus trichloride formed. Its composition was determined by ^{31}P NMR. In the ready reaction of the aluminate with iodide salts of tetraorganylammonium, a dependence of yield on cation dimensions was noted. Reduction involving KBr occurred only in the presence of triethylamine. Thus the test reactions indicate that chlorophosphonium derivatives undergo halogenophile conversions only under the effects of soft halogenide anions. Similar results came with bromine compounds. Chemical procedures are given in the experimental section. References 14: 8 Russian, 6 Western.

[283-12131]

PESTICIDES

AEROSOL USED AGAINST MOSQUITOES

Moscow SEL'SKAYA ZHIZN' in Russian 24 Jun 82 p 4

[Article by G. Tur'yev: "Aerosol Used Against Mosquitoes"]

[Text] Syktyvkar (Komi ASSR) -- Herds of reindeer from farms in the republic have set off toward the Arctic Ocean. There they will feed on the rich pasture land of the tundra.

The land there is rich not only in food. Unfortunately, the tundra also has huge swarms of midges and gadflies, so a special expedition from the Izhmo-Pechora veterinary research station has departed for the reindeer feeding area. Its members are armed with medicinal preparations as well as a small cannon-like aerosol device. With this device, they can "fire" at the insects pestering the animals. A light cloud is emitted which the insects cannot tolerate. The reindeer are already accustomed to the "cannon shots" and they run eagerly toward the sound of the shots.

9967
CSO: 1841/290

CHEMICALS PROHIBITED FOR USE IN PERSONAL GARDENS

Moscow SEL'SKAYA ZHIZN' in Russian 24 Jun 82 p 4

[Article by E. Balayev, deputy director of administration of plant protection at the "Rasselsel'khozkhimiya" Association, in the column "Your Home and Garden": "Not To Be Used"]

[Text] After publication of information about the use of poisonous chemicals in the battle against plant pests and diseases, many readers are asking: out of the more than 100 products named that are in use on kolkhozes and sovkhozes, why are we allowed to use only a few of them in our own gardens?

The reason for this is that on large tracts of land, this treatment can be used without concern that the poisonous materials will fall on the neighboring fields. But in private garden plots, parsley and lettuce grow right next to currants or apple trees. There is no guarantee that when spraying trees and bushes, you can keep the chemicals from landing on greens and other vegetable produce.

It is especially dangerous to use DDT in your own garden. Its use in agriculture was prohibited 11 years ago, but some stores of this potent poisonous chemical have been preserved. DDT is extremely resistant to decomposition by environmental factors. It remains in the soil for a very long time. If you use it just once in your garden, you risk "reaping" the consequences of your carelessness for many years. Even in small quantities, DDT can have chronic toxic effects, damaging the liver, kidneys, and the nervous system. If it ends up in a mother's breast milk, it can interfere with normal growth and development of a nursing infant. Signs of DDT poisoning are headaches, dizziness, insomnia, loss of appetite, and rapid mental and physical fatigue.

Preparations containing hexachlorane also can have chronic toxic effects and cause damage to the nervous system. Hexachloranes are very stable: after a year in the soil, only one-fourth of their original quantity has been broken down. The presence of hexachlorane can be detected by its putrid odor and taste even in milk, butter, and eggs from chickens that have been fed on plants treated with hexachlorane. In areas where hexachlorane has been used, potatoes and other vegetables cannot be planted for four years.

We also prohibit the use of polychlorpinenes in private gardens, since it does not degrade well. The use of the herbicide cymazine is prohibited as well; even though it is not very toxic to humans, if it is used to kill weeds in between garden rows, nothing besides corn can be grown in that soil for many years. Furthermore, rain and ground water can carry the herbicide outside the boundaries of its original application.

In recent years, we have also removed cyneb, formalin, homicin, and sodium trichloroacetate from the list of chemicals approved for use by the general public. To prevent contamination of agricultural produce and the environment, use only those substances approved for general use. For information about those preparations, see the issues of this paper from 14 and 28 January and 11, 18 and 25 February of this year.

Not long ago, the following substances were added to the list of protective chemical products approved for retail sale to the public: actellic, ambush, bromophos, diazinon, methathion, oleocuprite, preparations numbered 30, 30A, 30C, 30CC, 30M, powdered sulfur, sumicidin, phosalon, cyanox, ethaphos, isophen, aphos, baileton, rovral', FDN, tiazon, diuron, dichloral urea, and semeron.

9967
CSO: 1841/290

UDC 632.951

EFFECTIVENESS OF PYRETHROID INSECTICIDES IN COMBATING CODLING MOTH

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 5, May 82 pp 34-35

KHOLCHENKOV, V. A., candidate of biological sciences, Crimean Toxicological Laboratory of the All-Union Institute of Plant Protection

[Abstract] The authors sought to determine the technical and commercial effectiveness of the title insecticides and their effects on Arthropods in an apple orchard. They tested Ambush, Decis, Sumicydin, Ripcord and Cymbush, in a 20-year old orchard in the Simferopol area, which has Renet Simirenko apples, spraying a 3 + 2 schema -- three against the first generation moths, two against the second -- in 1979 and a 3 + 1 schema in 1980. Codling moth damage was determined on selected trees for both fallen and harvested fruit, and the insecticides' effects measured on useful and on plant eating insects. While all the insecticides were very effective in protecting the apples, they also promoted mass multiplication of various phytophagans, largely by killing off the acariphagans. Thus optimal timing and application methods are essential when using these insecticides, to prevent disturbing the biocenotic balance. Figure 1; references 2 (Russian).

[258-12131]

UDC 632.954:631.5.

SOIL PREPARATION AND HERBICIDES IN CROP ROTATION

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 5, May 82 pp 37-41

KHOLMOV, V. G., candidate of agriculture sciences, MOKSHIN, V. S. and OVCHINNIKOV, P. P., Siberian Scientific Research Institute for Agriculture

[Abstract] In a fallow-wheat-wheat-corn-wheat-barley rotation, the authors studied long-term effects of herbicides and various soil preparation techniques on the number and type of weeds, yield and technical properties of the wheat produced. Plowing, disking and minimal soil preparation methods in various combinations were used. The herbicides tested included 2,4-D, Reglon, Bayalan,

Diameth-D, Methafen and Dialen. The test plots, made up of moderately loamy leached chernozem, contained numerous dicotyledons, bristle weed and barnyard millet. Methods of cultivation and herbicide use was shown to have a key effect on both weed content and technical quality of the wheat. Bayalan, Diameth-D and 2,4-D generally improved grain quality, particularly where little soil preparation was used; 2,4-D had the best effect. Increased protein and gluten content was attributed to a reduction in carbohydrates in the test wheat. In the rotation, weed mass gradually increased as numerous species became resistant to 2,4-D. 2,4-D and Diameth-D in combination with minimal soil preparation had little impact on weed mass as the weeds developed resistance to them. In these cases Bayalan was more effective. Figure 1.
[258-12131]

UDC 632.954:633.15

EFFECTIVENESS OF HERBICIDES ON CORN PLANTINGS IN SOUTHERN KAZAKHSTAN

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 5, May 82 pp 41-42

PAK, K. I., candidate of agricultural sciences, Agricultural Test Station, Chimkent

[Abstract] Weed infestations limit the success of planned corn yield in southern Kazakhstan, partly because the region's soils contain 200-250 million weed seeds per hectare, along with 1-2 tons of plant organs and 5-10 million buds. Agelon, Gesaprim and preparation A-3620 were tested in 1977-1979 both in pure form and mixed with NP-fertilizers. The long-irrigated serozem of the test plot was analyzed, then herbicides sprayed on in pure form or distributed with NP-fertilizer. A hybrid of Kazakhstanskiy 43TV was planted; during the growing period the field was cultivated twice, fertilized twice with N₆₀P₁₆₀, and irrigated 5 times. Results showed that the herbicides killed 86.6 to 93.5% of the weeds and increased yields 5.9-8.1 centner/ha. No significant residues of the herbicides were found in the soil by late July or in the corn plants beyond the first stage of the growing period.

[258-12131]

UDC 631.811.98:633.11

USING TUR(CHLOROCHOLINCHLORIDE) GROWTH RETARDANT TO INCREASE WINTER WHEAT PRODUCTIVITY UNDER IRRIGATION

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 5, May 82 pp 42-45

PIKUSH, G. R., doctor of agricultural sciences, and SAKHAROV, V. D., candidate of agricultural sciences, All-Union Scientific Research Institute for Corn

[Abstract] The Institute's method for preplanting treatment of seeds with the retardant has gained wide acceptance in recent years. It acts by promoting

deep growth of the tiller, bringing better wintering and increased drought resistance and productivity. Combating beating down has led to applying the same compound in spring, but under irrigation, where large stalks grow, this is insufficient. The authors combined these methods at the Institute's test station in Dnepropetrovsk Oblast on southern chernozem with little humus and deep ground water, using a 10% solution on seeds, spraying the plantings at 2 and 4 kg/ha, and spraying again in spring. The wheats were Dneprovskaya 775, which resists beating down, and Odesskaya 51, which does not. Temperature and moisture conditions varied, but soil moisture was kept at 70-75% saturation. In all years, better yield increases were achieved with Odesskaya 51, but improvement was recorded in both varieties in all growing periods but 1979, when fall growing conditions were poor. As the increased yields led to low protein and gluten content because of nitrogen shortages, urea was applied to correct that problem. With this correction, the application of the growth retardant in both fall and spring was found to improve resistance to beating down and maintain grain quality while sharply increasing yields. Figure 1.
[258-12131]

UDC 547.832.632.95

PESTICIDAL AND GROWTH-REGULATING ACTIVITY OF 1-METHYL-3-ARYLBENZO[f]QUINOLINE-2-CARBOXYLIC ACID ETHYL ESTERS AND THEIR QUATERNARY SALTS

Minsk VESTSI AKADEMII NAVUK SSSR: SERYYA KHIMICHNYKH NAVUK in Russian No 3, May-Jun 82 (manuscript received 22 Dec 81) pp 61-64

KOZLOV, N. S., SAUTS, R. D., ROZHKOVA, N. G., SERZHANINA, V. A. and ANDREYEVA, Ye. I., Institute of Physical and Organic Chemistry, Belorussian Academy of Sciences; and All-Union Scientific Research Institute of Chemical Substances for Plant Protection, Moscow

[Abstract] Results are presented from screening of benzo[f]quinoline series esters (I) and their quaternary salts (II) for pesticidal (insectoacaricidal and fungicidal) and growth-regulating activity. Compounds I and II were tested as contact insecticides and acaricides. The fungicidal activity was studied under laboratory conditions by injection into pure fungus cultures and under greenhouse conditions. Primary screening of the growth regulator properties of the compounds was performed on a tobacco cell culture. The studies showed that this group of compounds may be of interest for pesticidal and growth-regulation purposes. References 11: 10 Russian, 2 Western.
[282-6508]

UDC 547.491.8.07(088.8)

SYNTHESIS OF BENZIMIDAZOLYL-sim-TRIAZENES

Yerevan ARMYANSKIY KHMICHESKIY ZHURNAL in Russian Vol 35, No 5, May 82
(manuscript received 25 Mar 81) pp 339-341

DOVLATYAN, V. V., GYUL'BUDAGYAN, L. L. and AMBARTSUMYAN, E. N., Armenian Agricultural Institute

[Abstract] N-alkylcyanamino-sim-triazenes do not react with phenylenediamine and hydrochloride. Therefore, the compounds in the title were synthesized through the hydrochlorides of N-substituted triazinyl-0-alkylisoureas by heating with phenylenediamine in chloroform for a long period of time. Benzimidazol derivatives are of interest as pesticides. References 3: 2 Russian, 1 Western. [280-6508]

UDC 547.551.42:547.314

SYNTHESIS AND SEARCH FOR POTENTIAL PESTICIDES BASED ON ACYLATION OF AMINOALCOHOLS

Tashkent UZBEKSKIY KHMICHESKIY ZHURNAL in Russian No 2, Mar-Apr 82
(manuscript received 9 Jan 81) pp 34-38

ELMURADOV, B., MAKSUDOV, N. Kh. and SHAZHENOV, A. A., Tashkent Order of Labor's Red Banner Institute of Agricultural Irrigation and Mechanization Engineers

[Abstract] The reaction of certain aminoalcohols with aliphatic and aromatic acid chlorides and anhydrides as well as the acids themselves was studied. The initial aminoalcohols used were N,N-bis- β -oxyethylalanine (I), N,N-bis- γ -oxyethyl-o-chloroalanine (II), N,N-bis- β -oxy-o-anisidine (III), N,N-bis- γ -oxyethyl-o-bromoalanine (IV), and N,N-bis- β -oxyethyl-m-toluidine (V). The acylating agents used were acetic anhydride, acetyl, propionyl, butyryl, chloroacetyl, palmityl, steroyl, benzoyl and o-methoxybenzoyl chlorides, formic, acetic, chloroacetic, propionic and butyric acids. Tables of physical and chemical constants of the N,N-bis-alkoxy(aroyloxy)ethylarylamines are presented. References 5 Russian.
[2.6-6508]

AMINO ACIDS AND THEIR DERIVATIVES AS HERBICIDES AND PLANT GROWTH REGULATORS

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMICHESKAYA
in Russian No 3, May-Jun 82 (manuscript received 30 Dec 80) pp 84-87

TUMANOV, Ye. V., SENCHEVSKAYA, V. A. and DZHILKIBAYEVA, G. M., Institute of
Chemical Sciences, KaSSR Academy of Sciences, Alma-Ata

[Abstract] Among amino acids with herbicidal and plant growth regulating action, "Suffix" and "Karachol," based on ethyl-N-benzoyl-N(3,4-dichlorophenyl)-2-aminopropionate, are currently approved for Soviet use. Trials for experimental and industrial use are under way for "Amiben" and "Tordon 22K," based respectively on 2,5-dichloro-3-aminobenzoic and 3,5,6-trichloropicolinic acids. The authors review work on use of amino acids as herbicides and growth regulators as seen in patents granted in the USSR, Bulgaria, Great Britain, The United States, France and Japan. Amino acids so used are aliphatic, aromatic, heterocyclic acids and their derivatives. The most-frequently patented are alpha-aminocarboxylic acids of the L-series; they are generally water-soluble salts of ammonium, alkali and alkaline-earth metals. Higher alkyl esters are shown to be less toxic for man and animals than derivatives of carbamates, diphenyl esters, symm-triazine or urea. Phenylalanines derivatives are active and are frequently combined with inert substances or with triazines, methyldioxybenzene or phenoxyalcanes. Methyl, ethyl or isopropyl esters of N-benzoyl-(3,4-dihalophenyl)-alanine were more selective herbicides and growth regulators in grain crops than the corresponding acids. Various amino benzoic acids and their derivatives, and heterocyclic amino acids containing a pyridine ring have also received attention. Japanese firms have been particularly interested in carbomoyl derivatives. References 14: 2 Russian, 12 Western.
[270-12131]

PHARMACOLOGY AND TOXICOLOGY

UDC 615.254.1:547.828].015

NEW INHIBITORS OF XANTHINOXIDASE FROM CLASSES OF PYRAZOLO[3,4-d]PYRIMIDINES
AND PYRAZOLO[3,4-b]PYRIDINES, REPORT 2: COMPARATIVE EVALUATION OF EFFECTIVENESS

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 6, Jun 82
(manuscript received 3 Nov 81) pp 655-660

BARTANYAN, L. S., RASHBA, Yu. E., KOZACHENKO, A. I., KORBUKH, I. A.,
BULYCHEV, Yu. N. and PREOBRAZHENSKAYA, M. N., Institute of Chemical Physics,
USSR Academy of Sciences; All-Union Scientific Oncological Center, USSR Academy
of Medical Sciences, Moscow

[Abstract] A previous report suggested the mechanism of inhibiting xanthinoxidase; in the present study the authors present results of their consideration of the inhibiting activity of the title compounds, which are analogs of allopurinol. Enzyme action was measured without preliminary incubation as the decrease in initial rate of fermentation. As with allopurinol and the recent example of alloxanthine, formation of a stable complex was preceded by formation of a rapidly reversing complex. Comparison of inhibitor concentrations and the constant of dissociation of rapidly formed xanthinoxidase complexes with the inhibitor show that only 1,5-substituted 4-hydroxy-pyrazolopyrimidines were close in activity to allopurinol; all others were weaker inhibitors. For some of the many complexes tested, introduction of a carboxyl group at position 5 increased inhibiting activity greatly, by more than a factor of 10. Results suggested good prospects for active, practically irreversible inhibitors among pyrazolo-pyrimidines substituted at positions 4 and 6 with hydroxy-, mercapto- or methylmercapto-groups and with hydrophobic or nucleophile substituents in positions 1 or 5. These complexes could be used in medicine and as ligands in affine chromatography of xanthinoxidase. Figure 1; references 15: 8 Russian, 7 Western.
[269-12131]

UDC 615.332.547.567].012.1

BIOLOGICALLY ACTIVE HETEROCYCLIC QUINONES (REVIEW)

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 6, Jun 82
(manuscript received 3 Nov 81) pp 667-678

TSIZIN, Yu. A. and CHERNYAK, S. A., Institute of Medical Parasitology and Tropical Medicine imeni Ye. I. Martsinovskiy, Moscow

[Abstract] Interest in the title quinones, which began 15-20 years ago, has been directed at the high biological activity of certain natural compounds in the group, but compounds with valuable chemical therapeutic properties have also been discovered among synthetic heterocyclic quinones. The authors review and systematize research up to the present. They discuss nitrogen- and oxygen-containing types, the former of which include mitomycin antibiotics produced by streptomycetes *S. caespitosus*, *S. verticillatus* and *S. arduus*, discovered by Japanese researchers. Mitomycines contain 3 centers that are connected with tumor control: a carbamoyl group, an aziridine ring and a methoxy(amino) quinone system. Simpler and less toxic analogs are being sought. Antibiotic properties seem to be related to low lipophilicity and rather low redox potential. Streptonigrines produced by *S. flocculus*, *S. albus* and *S. lavendulae* also control tumors, by inhibiting DNA synthesis through causing isolated chain breaks. Isoquinoline quinones produced by *S. lavendulae* affect certain tuberculosis mycobacteria. Kinamycines produced by *S. muraymaensis* affect Gram-positive bacteria by cross-linking DNA. Anthraquinone heterocyclic analogs and tyrosine melanines that provide pigmentation for all sorts of organisms are also mentioned among nitrogen-containing natural types. Oxygen-containing types include representatives of the genus *Streptomyces* with an isochromanquinone fragment, which have antibiotic activity because of bis-alkylating agents, and others. The review ends with advances in synthesis, noting that, typically, these compounds have donor substituents in the quinone ring. References 109: 8 Russian, 101 Western.

[269-12131]

UDC 615.281.8:547.473.2].012

STUDY OF UNSATURATED LACTONES, REPORT 73: SYNTHESIS AND ANTIVIRAL ACTIVITY OF CERTAIN SUBSTITUTED 2-BUTENE-4-OLIDES

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 6, Jun 82
(manuscript received 26 Jun 81) pp 679-682

AVETISYAN, A. A., DZHANDZAPANYAN, A. N., NAZARYAN, R. G., VOTYAKOV, V. I., KHLYUSTOV, G. V., VLADYKO, G. V., KLIMOVICH, V. Ya., KOROBCHENKO, L. V., SHASHIKHINA, M. N. and ZHAVRID, S. V., Yerevan University; Belorussian Scientific Research Institute of Epidemiology and Microbiology, Minsk

[Abstract] Both natural and synthetic compounds with a lactone ring are known to have biological activities of many types. The authors produced new

2-butene-4-olides by chemical reduction of 2-acyl derivatives and studied their activity. The initial substituted 2-acetyl-2-butene-4-olides and the chloroanhydride of 2-carboxy-3,4,4-trimethyl-2-butene-4-oxide were identified and confirmed with spectral analysis and thin layer chromatography. Chemical details are given in the experimental chemistry section. Effects were studied on various flu viruses, Venezuelan equine encephalomyelitis, adenovirus, Herpes simplex and other viruses and vaccines. Results showed that most of the compounds studied were inactive in relation to the test viruses. A 2-(1'-iminoethyl)-3,4,4-trimethyl-2-butene-4-oxide showed weak activity toward Venezuelan equine encephalomyelitis, and the hydrochloride of thiosemicarbazide of 2-carboxy-3,4,4-trimethyl-2-butene-4-oxide had a weak inhibiting effect for flu virus and antiviral action for Herpes simplex. References 20: 10 10 Russian, 10 Western.
[269-12131]

UDC 615.276+615.212]:547.775].012.1

SYNTHESIS AND BIOLOGICAL ACTIVITY OF PYRROLYL-SUBSTITUTED PYRAZOLONES-5

Moscow KHMICO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 6, Jun 82
(manuscript received 2 Jul 81) pp 687-692

ZHESTKOV, V. P., VORONIN, V. G., SUSLINA, M. L. and ZAKS, A. S., Moscow Oblast Branch, All-Union Scientific Research Chemical-Pharmaceutical Institute imeni S. Ordzhonikidze; Perm Medical Institute

[Abstract] The authors synthesized a number of compounds of the title type and studied their antiphlogistic, analgesic and antipyretic activity. Best results were obtained using 5-10% excess sodium ethylate to produce keto-esters by alkylation of 2,4-dimethyl-3-carboethoxy-acetyl-5-carboethoxypyrrrole. The structure of this and other pyrrolyl-beta-ketoesters was confirmed by mass-spectrometry, as were those of the remaining pyrrolyl-substituted pyrazolones-5 in the test. Acute toxicity, antiphlogistic and analgesic activity were determined in mice and rats. 4-Alkyl-3-(2,4-dimethyl-5-carboethoxypyrryl-3)-pyrazolones-5 at first caused heightened motor activity, but in 20-30 minutes that was followed by ptosis, central nervous system depression and eventual death by the end of the first day. The other compounds had no such effects, but brought hypothermal and antiphlogistic results depending on their particular structures. They were less toxic than the control, amidopyrine. References 10:
3 Russian, 7 Western.

[269-12131]

UDC 615.381.8:546.27].012.1

ANTIVIRAL ACTIVITY OF BORON CHELATES SYNTHESIZED FROM 2-AMINOPYRIDINE

Moscow KHMICO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 6, Jun 82
(manuscript received 14 Dec 81) pp 695-699

LAGUTKIN, N. A., MITIN, N. I., ZUBAIROV, M. M., DOROKHOV, V. A. and
MIKHAYLOV, B. M., All-Union Scientific Research Institute of Veterinary
Virology and Microbiology, USSR Ministry of Agriculture, Vladimirskaya Oblast;
Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences,
Moscow

[Abstract] The authors studied a number of coordinate boron compounds that had heightened chemical stability. The title chelates and derivatives have a tetra-coordinated boron atom in a six-membered ring condensed with a pyridine ring. The experimental chemistry section gives chemical details. All chelates were studied in vitro, in ovo and in vivo for antiviral activity in fibroblast cell cultures of large embryos, in 1-day chicken embryos, and in 70-80-day-old chicks. Results showed that the title chelates and complexes of 1-boraadamantane had similar inhibiting action for Aujeszky's disease and large fibroblast embryos. The chelates had a somewhat better protective effect for chicken embryos infected with Newcastle's disease, while 1-boraadamantane derivatives were more effective for poultry flu virus. References 9 (Russian).
[269-12131]

UDC 615.31:547.288.15'173'113.1

HYDRATED HEXAMETHYLENE TETRAMINE COMPLEX OF COBALT CHLORIDE, A BIOACTIVE
COMPOUND

Frunze IZVESTIYA AKADEMII NAUK KIRGIZSKOY SSR in Russian No 2, Mar-Apr 82
(manuscript received 24 Dec 81) pp 37-39

SABIROVA-NIKITINA, T. S., AKTANOVA, S. T., NANAYEVA, M. T. and IMANAKUNOV, B. I.,
Institute of Inorganic and Physical Chemistry, KiSSR Academy of Sciences;
Kirghiz State Medical Institute

[Abstract] Inorganic salts with the title amine, which form by simple mixing, have long been used in medicine, but literature reports about them are contradictory. The authors studied the reaction of cobalt chloride with HMTA and obtained the new compounds $3\text{CoCl}_2 \cdot 2(\text{CH}_2)_6 \cdot 6\text{H}_2\text{O}$ and $\text{CoCl}_2 \cdot 2(\text{CH}_2)_6\text{N}_4 \cdot 10\text{H}_2\text{O}$. The latter was studied by physical-chemical analysis, thermal durability test and infrared spectral analysis. Toxic and hematopoietic comparisons showed it to be less toxic than commonly used coamide; it had a generally beneficial effect on test rabbits and rats, inducing weight gain and increased hemoglobin and erythrocytes in peripheral blood, with no pyrogenic effect. At 2 mg/kg of body weight it had a more pronounced hematopoietic effect, and this increased markedly at 5 mg/kg. Its high biological activity is apparently related to

its structure, with its Co^{2+} cation being fully insulated by coordination and by hydrogen-bonding water molecules. References 4: 3 Russian, 1 German.
[360-12131]

UDC 547.853.7

ADVANCES IN CHEMISTRY OF HYDRAZINOPYRIMIDINES (REVIEW)

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 5, May 82
(manuscript received 21 Sep 80) pp 579-600

IVASHCHENKO, A. V. and GARICHEVA, O. N., Scientific Research Institute for
Organic Intermediates and Dyes, Moscow

[Abstract] The title compounds, their derivatives and heterocyclic systems based on them have anti-inflammatory, fever reducing, bactericidal and fungicidal actions; they also stimulate the central nervous system, act as sedatives and blocking agents, reduce blood pressure, inhibit DNA polymerase, etc. The authors review procedures for obtaining them by reactions of hydrazines with halogen pyrimidines, thio- and alkylthiopyrimidines, alkoxyypyrimidines, (methylsulfonyl)-pyrimidines and derivatives of pyrimidine-sulfonic acids, 2-nitroaminopyrimidines, aminopyrimidines and trimethylpyrimidinyl-ammonium salts, and other reactions. Chemical reactions of hydrazinopyrimidines include the action of water, acids and bases, reduction and oxidation synthesis of derivatives and of heterocyclic systems containing a pyrimidine ring. The latter section of the review is sub-divided into ten specific types of compounds. References 260: 48 Russian, 212 Western.

[262-12131]

UDC 636.089

RESULTS OF STUDYING EMBRYOTOXIC AND TERATOGENIC ACTION OF HEXICHOL

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 5, May 82 pp 49-51

KHRUSTALEVA, L. I., LAPTEVA, L. A. and VESELOVA, T. P., doctor of veterinary sciences, All-Union Institute of Helminthology imeni K. I. Skryabin

[Abstract] Hexichol, the medicinal form of hexachloroparaxylol, is widely used in the USSR to control parasitic worms in fasciolysis and dicroceliosis of livestock. The need for further study of embryotoxic and teratogenic effects led the authors to the present study. In it, 104 test and 61 control female rats were mated, and the test animals given 900 mg/kg of hexichol 3 times in the first 17 days of pregnancy. On the 20th day, they were killed and the number of live, dead and resorbed offspring counted and measured. Then offspring were divided into two groups, one of which was studied for the

condition of internal organs using the Wilson method, and the other studied for skeletal development using the Dawson method. Pre-implant zygote death and post-implant embryo death was calculated and a standard error of measurement for test and control groups established. There were no significant differences in skeletal development or in internal organs. References 3 (Russian).
[258-12131]

POLYMERS AND POLYMERIZATION

UDC 541.64:547.86

POLYMERIZATION OF 10-VINYLPENTHIAZINE IN PRESENCE OF ORGANIC pi-ACIDS

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 6, Jun 82
(manuscript received 11 Nov 80) pp 1135-1138

GORSHKOV, A. G., TURCHANINOV, V. K., SVYATKINA, L. I., KUROV, G. N. and SKVORTSOVA, G. G., Irkutsk Institute of Organic Chemistry, Siberian Branch, USSR Academy of Sciences

[Abstract] The authors had earlier shown that products of chemical reactions of acceptor electrons with the monomer initiated the title polymerization. Here, they used anthraquinone, p-toluquinone, p-benzoquinone, 2,4,7-trinitrofluorenone and 7,7,8,8-tetracyanoquinodimethane acceptors, conducting the polymerization in evacuated ampules during freezing. The two fractions of poly-10-vinylpenthiazine were separated, then analyzed by electron spectroscopy. It appeared that the initial reaction rates increased as the energy of charge transfer decreased and acceptor electron numbers grew. Electron spin resonance methods showed that introduction of a cation inhibitor into the reactive mass almost completely suppressed polymerization. The dualism of the cation-radical chemical properties suggest polymerization of the monomer by both cation and radical mechanisms, but the lack of a styrene copolymer with the title thiazine and/or its homopolymer during polymerization with 7,7,8,8-tetracyanoquinodimethane point to the effective suppression of the radical function. The existence of free ions suggests a balance between macrocations and their ion pairs with the anion-radicals during initiation and chain growth. Addition of the radical salt K^+TCQD^- led to a shift in balance in the direction of the ion pair, reducing yield of the R_t fraction and increasing oligomer R_p fractions in the final product. Initiating polymerization includes a stage where donor-acceptor complexes are formed, followed by ionogenic dissociation and recombination of the cation-radical monomer into a dication. The nature of the acceptor used and the mobile ion pair macrocation balance determine molecule mass of the polymer products. Figures 2; references 17: 9 Russian, 8 Western.

[264-12131]

UDC 541.64:547.341

SYNTHESIS, STRUCTURE AND PROPERTIES OF POLYMERS OF 3,4-DICHLORO-1,3-BUTADIENE-2-PHOSPHONATES

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 6, Jun 82
(manuscript received 11 Feb 81) pp 1252-1257

LYKOV, A. D., MASHLYAKOVSKIY, L. N., REPKIN, V. Yu. and OKHRIMENKO, I. S.,
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[Abstract] In radical polymerization, 1,3-alkadiene-1-phosphonates form high-molecular hard homopolymers that are more like plastics than elastomers. It is natural to expect significant changes in microstructure and properties when phosphonoprenes are used as the initial monomers. The authors present results of the title phosphonates reaction with radicals of CH_3 , C_2H_5 , C_3H_7 , iso- C_3H_7 , C_4H_9 , and C_6H_5 . Polymerization was conducted in sealed ampules in argon or air at about 70°C , with "DAK" [expansion unknown] as initiator. The title compound was very reactive; with increasing depth of polymerization, the growth of polymers of the title compound pointed to formation of branched polymers as allyl atoms of chlorine and hydrogen were transferred to the chain. The type of combination of monomer chains was clarified by ^1H and ^{31}P NMR and infrared spectroscopy. Results showed the formation of polymers of more regular structure than in polymerization of 1,3-alkadiene-1-phosphonates, which contain only 1,4-links of trans-configuration. After reprecipitation and vacuum drying, the poly-DBP compounds were solid durable plastics or rubber-like polymers, which were readily soluble in chlorinated and aromatic hydrocarbons and other solvents. They were stable when heated in air at $150-200^\circ$, but lost 10% of their mass at $220-240^\circ\text{C}$ due to dehydrochlorination. At temperatures of the order of 300° the rate of decomposition slows sharply. They do not burn in flame but decompose to a carbon residue. Figures 4; references 13 (Russian).
[264-12131]

UDC 678.664.546.268.2

CONDITIONS OF FORMATION OF FURANE OLIGOAMIDOURETHANE FROM HEXAMETHYLENE DIISOCYANATE

Tashkent UZBEKSKIY KHMICHESKIY ZHURNAL in Russian No 2, Mar-Apr 82
(manuscript received 1 Oct 81) pp 24-26

KUCHKAROVA, L. Kh., MAGRUPOV, F. A. and ABDURASHIDOV, T. R., Tashkent Order of Friendship of Peoples Polytechnical Institute imeni Abu Raykhana Beruni

[Abstract] Some of the conditions of formation of furane oligoamidourethane (FOAU) from hexamethylene diisocyanate and furfuryl alcohol are studied, as well as the properties of coatings made from FOAU. The initial reagents were purified by double vacuum distillation and synthesis was performed in a mass and in a solution of cyclohexanone. It was found that triethylamine has an

effective catalytic influence when present at 0.5% or higher. Though the reaction rate of the initial reagents is much slower in solution than in a mass, after the content of NCO groups in the mass reaches 9 to 11% it becomes so thick that agitation becomes impossible. Increasing the temperature of synthesis accelerates the reaction, and formation of FOAU is completed within 6 hours at 428 K. The coatings produced become harder while retaining good elasticity and impact resistance when the temperature at which coatings are treated is increased from 473 to 573 K. Figures 2; references 5 (Russian).
[286-6508]

UDC 541.64:542.952

SYNTHESIS OF GRAFT COPOLYMERS OF CELLULOSE TRIACETATE-POLYMETHYLMETHACRYLATE BY CONTINUOUS RADICAL POLYMERIZATION IN PRESENCE OF COMPLEX FORMERS

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 2, Mar-Apr 82
(manuscript received 5 May 81) pp 31-33

AKBAROV, Kh. I., OLENIN, A. V., TASHMUKHAMEDOV, S. A. and ZUBOV, V. P.,
Tashkent State University imeni V. I. Lenin; Moscow State University imeni
M. V. Lomonosov

[Abstract] Graft polymerization in the presence of complex formers is interesting for controlled synthesis of graft polymers. The authors studied the kinetics of post-radiation graft polymerization of methylmethacrylate in the presence of H_3PO_4 on γ -irradiated cellulose triacetate film 40-50 μ/m thick containing 59.2% bonded acetic acid. Gamma rays from a cobalt 60 source were used to bombard the films in a vacuum at 107 rad/sec and 196°C. Graft polymerization was performed in a vaccum at 20°C by introduction to the reaction system of a molar ratio of $H_3PO_4:MMA=0.3:1.0$. The modified films were then extracted with benzene in a Soxhlet apparatus for 30 hours to remove the PMMA formed as a side product, then vacuum-dried to constant mass. The composition was determined gravimetrically. The reaction mechanism was found to be complicated by the specifics of diffusion of the reaction mixture in the cellulose triacetate, but allows controlled synthesis while monitoring the degree of grafting, molecular mass and number of graft chains. Figures 2; references 3: 2 Russian, 1 Western.

[286-6508]

RUBBER AND ELASTOMERS

UDC 678.762.2-134.532.134.433.043.4.8:54

PREVENTING PREMATURE VULCANIZATION OF RESIN MIXTURES BASED ON CARBOXYLATED BUTADIENE-NITRILE RUBBER

Moscow KAUCHUK I REZINA in Russian No 6, Jun 82 (manuscript received 26 Dec 80)
pp 22-24

GUSEV, Yu. K., ROMANOVA, A. B., FILINOV, G. P. and YAKOVENKO, E. I.,
Voronezh Branch, All-Union Scientific Research Institute for Synthetic
Rubber imeni S. V. Lebedev

[Abstract] Premature vulcanization hinders broad use of the title elastomers. Study is reported of the effects and properties of the products of these resins when magnesium and zinc oxides, and master blends of rubber with oxides and peroxides of bivalent metals, were used. Zinc and magnesium peroxides provided great resistance to scorching, but they partially decomposed and threatened to cause fire in the preparation process. Various adjustments in metal content and in the process did not solve these disadvantages. Vulcanisates were produced by using combined vulcanizing agents which were composed of a master batch (containing zinc oxide and peroxide, SKN-26 and SKN-40) prepared at the latex stage, and tetramethylthiuram disulfide. Figure 1; references 4:
2 Russian, 2 English.
[265-12131]

UDC 678.021.17:678.04

EFFECT OF MIXING PROCEDURE ON PROPERTIES OF MIXES MODIFIED BY
p-NITROSODIPHENYLAMINE

Moscow KAUCHUK I REZINA in Russian No 6, Jun 82 (manuscript received 23 Apr. 81)
pp 24-26

SHVARTS, A. G. and KNYAZEVA, L. A., All-Union Scientific Research Institute
for Tire Production

[Abstract] Combinations of rubbers used in making tires can have varying qualities depending on preparation procedures. The title amine is an effective modifier for synthetic cis-polyisoprene. The authors studied its role when

added at the mixing stage in mixes of stereo-regular rubbers aimed at optimal technological and wearing properties, with a 70:30 mix of SKI-3 and SKD, filled with PM-100 carbon and without stabilizers. By varying the mixing order, they obtained different plasticity, hardness, viscosity and swelling values. When the title amine and PM-100 were added at the same time, apparently part of the modifier was adsorbed on the carbon, thereby reducing the number of durable bonds between the elastomer and the filler. The tests indicated that the best properties were obtained when p-nitrosodiphenylamine and zinc oxide were added simultaneously in the second stage of mixing. References 13: 10 Russian, 3 English.

[265-12131]

UDC 541.64:546.215:547.315.3

STUDY OF OLIGOMERIZATION OF ISOPRENE WITH HYDROGEN PEROXIDE INITIATION

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 6, Jun 82
(manuscript received 1 Dec 80) pp 1168-1173

VALUYEV, V. I., DMITRIYEVA, T. S., SHLYAKHTER, R. A., YATSIMIRSKAYA, T. S., BOYKO, V. P. and GRISHCHENKO, V. K., Institute of High-Molecular Compound Chemistry, UkrSSR Academy of Sciences; All-Union Scientific Research Institute for Synthetic Rubber imeni S. V. Lebedev

[Abstract] Radical polymerization of diene monomers initiated by hydrogen peroxide is a simple manner for obtaining oligomers containing hydroxyl-groups for making frost-resistant, hydrolytically-stable polyurethanes. The authors tested methyl, ethyl, propyl and carbon-labeled radioactive isopropyl alcohols, with monomer:initiator ratios of 3:1. Average molecular mass of the oligomers formed was determined by ebullioscopy or by measuring the heat effects of condensation with toluene as the solvent. Molecular mass difference was determined by gel chromatography. The distribution by functional types of samples synthesized in isopropyl alcohol showed that the quantity of monofunctional molecules (by primary OH-groups) was 40-45 molecular percent. Assay of the concentrations of isopropanol fragments of ^{14}C showed 81-87% bifunctional molecules in oligoisoprene. Under mild synthesizing conditions, use of isopropyl alcohol sharply reduced the portion of bifunctional molecules, with effective functionality falling below 2. Figures 3; references 18: 14 Russian, 4 Western.

[264-12131]

ATTEMPTED EFFECTIVE USE OF PRODUCTION POTENTIAL IN SYNTHETIC RUBBER INDUSTRY

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IM. D. I. MENDELEYEVA
in Russian Vol 27, No 3, May-Jun 82 pp 261-266

SAZYKIN, V. V., chief, All-Union Industrial Association for Synthetic Rubber Production

[Abstract] The author reviews synthetic rubber development and production for tires and other uses, replacing and augmenting natural rubbers in both quantity and quality. Average annual growth has been at 9%, with isoprene, butadiene and various latexes growing by more than a third in the 10th Five-Year Plan. A significant advance has taken place in synthetic rubber production jointly with monomer products at nearly all Soviet rubber plants. Inhibitors to prevent thermal polymerization of monomers is isoprene and divinyl production have brought major savings. The example of the Nizhnekamsk Petrochemical Association is cited, where benzene for ethylene and heavy oil for a power plant are produced jointly. Catalytic improvements, to control butyl rubber polymerization, new catalysts for dehydrogenation to produce isoprene from isooctane and other new procedures are summarized. Cis-isoprenes and cis-butadienes, and the new SKI-3-01 rubber being produced at the Togliatti Rubber Plant, are characterized by properties that exceed natural rubbers, such as cohesion, better resistance to deformation, improved elasticity and wear, and other features. Resins for abrasives, asbestos products and electronics are also discussed. Urethane elastomers for automobiles and tractor engine uses, and rubber shoe soles are being improved in durability and economy of production. The organization of Soviet synthetic rubber production, use of secondary energy sources, and conservation and re-use of rubber products are also discussed.

[279-12131]

WOOD CHEMISTRY

UDC 615.31:547.926.5.04:579.8

TRANSFORMING SITOSTEROL WITH VARIOUS BACTERIA

Moscow KHMIMKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 6, Jun 82
(manuscript received 12 Jan 81) pp 722-727

AMELINA, A. S., KOROBOVA, Yu. N., GRECHUSHKINA, N. N., GABINSKAYA, K. N.
and MESSINOVA, O. V., All-Union Scientific Research Chemical-Pharmaceutical
Institute imeni S. Ordzhonikidze, Moscow

[Abstract] Citing the need for low-cost and available materials for synthesizing steroid hormones, the authors studied bacteria that are capable of producing such compounds from sitosterol obtained from wood-industry waste. They found the best source in mycobacteria; 158 strains, of which 96 were domestic, were obtained from collections, and 62 strains were separated from soil. This layer chromatography was used to identify products of transformation. Various factors affected the results, such as, composition of the culture media, initial pH, aeration and mixing, temperature, inhibitors, additives, etc. Results showed that while many of the tested strains could cause breakdown of the sitosterol, only 29 were capable of gathering the products of transformation in the culture medium, and only 9 could form significant amounts of the complete products. Various transformation products were produced by Myc. *flavum* var *methanicum* B₂ and B₅, and *Protoaminobacter alboflavum*, *Myc. mucosum* 3-AP, 12-F, *Myc. lacticola* 114 and 117, *Myc. perrugosum* 850 and *Myc. parafinicium* 134. Figures 2, references 5: 1 Russian, 4 Western.
[269-12131]

UDC 634.0.813.2

VOLATILE SUBSTANCES OF BIOLOGICALLY ACTIVE PRODUCTS SEPARATED FROM FIR WOOD FOLIAGE

Riga KHIMIYA DREVESINY in Russian No 3, May-Jun 82 (manuscript received 2 Apr 82) pp 96-98

YAGODIN, V. I., KOKSHAROV, A. S., ANTONOV, V. I. and YAGODINA, M. A., Leningrad Academy of Forest Technology imeni S. M. Kirov; "EFIRMASLO" Scientific Production Association

[Abstract] Due to difficulties and low quantities in obtaining the title substances, little study has been devoted to them. The authors analyzed the composition of these substances from products from the Lisinskiy Educational and Experimental Forest Station, which processes *Picea excelsa* L with 58-62% needles. Products included, in mass percentages, 0.8-1.08% conifer chlorophyll-carotene paste, 0.33-0.38 sodium chlorophyllin, 0.7-0.8 raw chlorophyllin, 0.4-0.66 balsam paste, 0.08-0.10 provitamin concentrate, 0.4-0.91 conifer wax, and 0.04-0.06 conifer feed flour. Volatile substances consisted 40-70% of benzene and 30-60% of ether oil, with the latter containing 27 different components. Major among them were about 86% oxidized terpenes and sesquiterpenes (17.2%), in the chlorophyll-carotene paste, 27.6% bornyl acetate and terpineol alcohols with borneol (16.2%) in the provitamin concentrate, etc. Changes in the composition of the ethereal oils are basically from oxidation and losses of highly volatile components, changes in proportions of terpene hydrocarbons and oxidized terpene derivatives during the production of bio-active products. References 2 (Russian).

[263-12131]

UDC 547.458.81

LEAF POLYSACCHARIDES, PART 1: DESCRIPTION OF CELLULOSE OF ANATOMICAL PARTS OF MULBERRY LEAF

Riga KHIMIYA DREVESINY in Russian No 3, May-Jun 82 (manuscript received 14 Jul 82) pp 99-102

CHERNO, N. K., DYDKIN, M. S. and BELKINA, N. Ye., Odessa Technological Institute for the Food Industry imeni M. V. Lomonosov

[Abstract] With possible energy production in mind, the authors studied the cellulose of the veins and the leaf membrane of *Morus alba* from the Odessa area. Cellulose was separated with a 3% nitric acid solution; polysaccharides comprised 96 and 92% of veins and membranes, respectively. Paper chromatography was used to find glucose and xylene. Alcoholysis and X-ray structural analysis indicated a clear difference in the supermolecular structure of the two samples, with a mesomorphic fraction accounting for 3 times as much of the leaf membrane

cellulose as of the vein cellulose. The total of amorphic and mesomorphic fractions was 40% of the membrane, or twice as much as in the veins. Molecular distribution was studied by fractioning from solution in a sodium ferrotartrate complex, which showed that vein cellulose was of higher molecular structure, had more crystallinity and larger crystallites, while leaf membrane cellulose contained significant amounts of a loosely packed fraction, thus giving it greater reactivity. The functional roles of the separate types of tissue were related to these differences. Figures 2; references 5: 4 Russian, 1 German. [263-12131]

UDC 547.791.3.2:914.3

OLEORESIN TERPENOIDS OF PICEA ORIENTALIS AND ABIES NORDMANNIANA GROWN IN CAUCASUS

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 2, Mar-Apr 82
(manuscript received 8 Jun 81) pp 189-194

SHMIDT, E. N., KHAN, V. A., ISAYEVA, Z. A., DREBUSHCHAK, T. D., DUBOVENKO, Zh. V., KEMERTELIDZE, E. P. and PENTEGOVA, V. A., Institute of Organic Chemistry, Siberian Branch, USSR Academy of Sciences, Novosibirsk; and Institute of Pharmaceutical Chemistry imeni I. G. Kutateladze, GSSR Academy of Sciences, Tbilisi

[Abstract] Chemical studies, up to the present, of oleoresins of firs have not included those in southern parts of the USSR. The authors studied the title trees to determine if the distinctive resins of *Morinda* and *Casicta* varieties were also to be found in Omorica firs. Specimens were taken from the Borzhomi ravine in 1979. Mono-, di- and sesquiterpene compounds were studied by gel-liquid chromatography and PMR. While monoterpane hydrocarbons found were similar to those of other firs, the sesquiterpenes differed sharply. Longifolene, alpha-longipinene and longicyclene were absent, as were cadinene and murolenes of Far-Eastern firs, but products of I,II-cyclization of trans-trans-farnesyl-pyrophosphate of caryophyllene and alpha-humulene were abundant. In all, 32 terpene compounds were identified in *Picea orientalis*, and 37 in *Abies nordmanniana* including 3 new sesquiterpene hydrocarbons. Other than typical diterpenoids for all firs, the latter tree contained methyldehydroabietate and 15-hydroxymethyldehydroabietate. Chemical procedures are presented in the experimental section. References 16: 14 Russian, 2 English.
[27 -12131]

MISCELLANEOUS

UDC 547.787.2'722.07:543.426

SYNTHESIS AND SPECTRAL LUMINESCENT PROPERTIES OF HETARYL ETHYLENE DERIVATIVES
OF 2,5-DIPHENYLOXAZOLE AND 2,5-DIPHENYLOXADIAZOLE-1,3,4

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 4, May 82
(manuscript received 23 Sep 81) pp 617-621

KRASOVITSKIY, B. M., YEGOROVA, N. P., AFANASIADI, L. Sh., LYSOVA, I. V.,
POLYAKOV, V. K. and TSUKERMAN, S. V., All-Union Scientific Research Institute
for Monocrystals, Scintillation Materials and Especially Pure Chemical Substances,
Khar'kov; Kharkov State University imeni A. M. Gor'kiy, Khar'kov

[Abstract] The synthesis of organic luminophores of various structures in
the title series indicated that it was possible to produce intensively-
luminescent substances for many uses. The authors studied more complex types
containing furan rings. These were obtained by RO-olefination, and their
structures were determined by infrared spectral analysis. Study of fluorescence
of isomer compounds showed that the position of the phenyl radical of the chlorine
atom had practically no effect on the nature of the fluorescent band or the
quantum yield. A hypsophloric effect accompanied by reduced intensity of
fluorescence was noted in comparing isomer ortho- and para-bromosubstituted
compounds. The highest scintillation effectiveness (114%) was obtained using
alpha-methyl naphthalene. The compounds can be used as spectral shifters in
obtaining liquid scintillators with longer-wave fluorescence than ROROR --
1,4-di-2-(5-phenyloxazolyl-2)-4[5-(4-chlorophenyl)oxazolyl-2]benzene.

References 9: 8 Russian, 1 English.

[262-12131]

UDC 66.064:66.063.2

SEMIPERMEABLE POLYMER MEMBRANE FOR SEPARATION OF CHCl₃-CCl₄ MIXTURES

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA, SERIYA 2: KHIMIYA in Russian
Vol 23, No 3, May-Jun 82 (manuscript received 6 May 81) pp 220-223

AGEYEV, Ye. P. and STRUSOVSKAYA, N. L., Department of Physical Chemistry

[Abstract] To achieve semipermeable properties for separation of a liquid mixture by evaporation through a membrane it is not sufficient that there be a great difference in the permeabilities for the individual substances. The presence of fluids of low polarity increases the permeability for the less compatible fluid since the diffusion coefficients depend on the degree of swelling and the joint plasticizing effect of the fluid facilitates mobility of macromolecular segments. Artificial aging by bombardment with α particles at 33 MeV was tested to improve selectivity of PTP membranes. It was found that artificial aging by irradiation reduced the permeability of the membranes but did not change the selectivity, which was independent of both membrane area and irradiation. Figures 4; references 6: 5 Russian, 1 Western.
[281-6508]

UDC 771.5+547.458.8

USE OF CELLULOSE Fe CATIONITES TO PRODUCE PHOTOGRAPHIC IMAGE

Minsk VESTSI AKADEMII NAVUK BSSR: SERYYA KHIMICHNYKH NAVUK in Russian
No 3, May-Jun 82 (manuscript received 27 Jul 81) pp 36-39

KOSHEVAR, V. D., YERMOLENKO, I. N., Institute of General and Inorganic Chemistry,
Belorussian Academy of Sciences

[Abstract] The purpose of this work was to determine the most light-sensitive acid cellulose esters in the form of salts of iron, to be used to create a material for optical information recording. Characteristic curves as a function of the content of COOH groups and iron in the salt were recorded in order to determine the photographic parameters of the salts. The maximum was found to correspond to 1.8% COOH groups and $2 \cdot 10^{-3}$ g/g iron. Light-sensitive paper was developed in two stages, by immersion of the exposed specimen for 5 seconds into a 7% sodium hydroxide solution and development in a copper-formaldehyde developer. Figures 2; references 4: 3 Russian, 1 Western.
[282-6508]

INFLUENCE OF OXYGEN ON PHOTOCHEMICAL PROCESSES IN THIN LAYERS OF ACRIDINE SOLUTIONS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 264, No 6, Jun 82
(manuscript received 10 Mar 82) pp 1417-1421

ZIN'KOVSKAYA, O. V. and GALASHIN, Ye. A., Moscow State University imeni M. V. Lomonosov

[Abstract] A study is made of the phenomenologic and kinetic specifics of photochemical transformation of acridine in thin layers and the influence of oxygen on these processes. The specimens were illuminated and visually observed in a luminescent microscope with a mercury vapor lamp generating UV(365 nm) radiation. A layer of solution 10^{-4} to 10^{-1} cm thick was irradiated in quartz microcuvettes over its entire area. Spectrophotometric studies were performed on a Specord UV-VIS instrument. Experiments with acridine solutions from which oxygen was removed indicated that the photoseparation effect is observed only when oxygen is present. Irradiation of deaerated acridine solutions produces weak luminescence, the distribution of which corresponds to the distribution of absorbed UV irradiation in the layer. In solutions containing oxygen, heterogeneous areas limited by a clear propagating luminescence front are seen at one or more points. With or without oxygen, irradiation results in the formation of acridine reduction products in the solutions. The experiments indicate that the moving luminescent zones result from photochemical processes involving molecular oxygen. The moving ring-shaped luminescent zone is apparently the area of reaction of radicals with diffusion oxygen around an area with reduced oxygen concentration in which the radical products are formed. The possibility of observing photoseparation results from the specifics of the complex oxidation-reduction process in thin layers in which movement is hindered and the development of photochemical processes disrupts the spatially homogeneous distribution of substances. Figures 3; references 7: 2 Russian, 5 Western.

[268-6508]

NEW INORGANIC MATERIALS AND THEIR ROLE IN ASSURING PROGRESS IN ELECTRONICS AND RELATED BRANCHES

Moscow ZHURNAL VSESOYUZNOGO KHMICHESKOGO OБSHCHESTVA IM. D. I. MENDELEYE .
in Russian Vol 27, No 3, May-Jun 82 pp 293-301

REZ, I. S., doctor of chemical sciences, Chairman of the Scientific Council on the Problem "Obtaining and Using Ferroelectric and Piezoelectric Materials," USSR State Committee on Science and Technology

[Abstract] The author reviews Soviet and world advances in dielectric materials, particularly ferroelectric and piezoelectric center-assymetrical products for acoustical and integral quantum electronics. The number of such eccentric

structures is more than 600,000, but currently only some 50 are being used in technology. He discusses ceramic and film piezotechnology, with special reference to perovskite types used for micropositioners, transformers, motors and high-voltage power sources. Acoustical electronics, largely surface sound waves, is a division of solid state physics related to fiber optics and laser applications. New materials include sulvanite and low-cost epitaxial zinc oxide structures on glass. Dielectrics include ceramics, monocrystals and coatings. The author discusses alloyed triglycine sulfate, beta-eucryptite and fresnoite as pyro-receivers. Quantum electronics used eccentric structures for generation, frequency adjustment and directing lasers, such as fiber-optical communication lines with large variations in refraction parameters. Discrete and constant laser modulation and deflection of laser beams also involve these materials. A potassium titanyl phosphate crystal produced in the United States in 1976 is cited for its optic non-linear quality in combination with the ray durability of KDP crystals. Amplitude and phase modulation use potassium dihydrophosphate, niobate, lithium tantalate, germano- and silicosillenate monocrystals. Reference to polyfunctional dielectrics and polar polymers concludes this review. References 176: 80 Russian, 96 Western. [279-12131]

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